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"DISORGANIZED BREATHING" - AN IMPORTANT FORM OF APNEA AND CAUSE OF HYPOXIA. Joyce L. Peabody, Alistair G.S. Philip and Jerold F. Lucey. University of Vt. College of Medicine, Department of Pediatrics, Burlington.

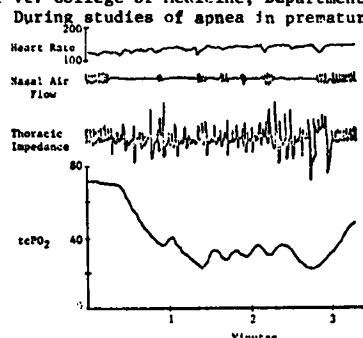


Fig. 1: Disorganized breathing with intermittent absence of nasal air flow resulting in a fall in  $t_cPO_2$  from 73 to 22 Torr

During studies of apnea in premature infants, we have observed an interesting phenomenon. In 21 infants (550-1870 gms) we monitored transcutaneous oxygen tension ( $t_cPO_2$ ), thoracic impedance (ATI), and heart rate, for 145 hours. During periods of apnea detected by thoracic impedance,  $t_cPO_2$  dropped as anticipated. An unexpected and frequent finding was a "disorganized" pattern of breathing, (DB), associated with a more rapid drop in  $t_cPO_2$ . Using a thermistor at the nose we monitored 6 infants. In each of 65 episodes of DB with a fall in  $t_cPO_2$ , we found either complete or intermittent absence of air flow by nasal thermistor, (An) (Fig.1). DB without air flow at the nares was found to occur most often in sleep and to result in hypoxia more frequently than ATI. We conclude that DB is an important form of apnea and cause of hypoxia not detectable by conventional monitoring.

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DIFFERENTIATION OF ENVIRONMENTAL FROM DISEASE RELATED FEVER IN THE NEONATE. Jeffrey Pomerance, Ricardo Liberman, Janet Torres, Cedars-Sinai Medical Center, Dept. Ped. and UCLA Sch. Med., Los Angeles (Spon. by B.M. Kagan).

Often it is difficult to differentiate environmental from disease related fever in the newborn. Other investigators have suggested that the foot of the overheated infant feels relatively warm, whereas it feels cool in the infant with disease related fever. This study was undertaken to establish the relationship between rectal temperature (RT) and peripheral skin temperature in the normal and overheated infant and to compare it with that relationship in the infant with a fever which is disease related.

A Spectrotherm 2000 thermographic unit was used to measure the skin temperature of the anterior and posterior mid-lower leg. Eighty-seven anterior and posterior paired readings were obtained in 25 normal 2-day old infants whose temperatures were in the normal range (36.44-37.56°C). Three additional paired readings were obtained in 3 infants who were inadvertently overheated. Plotting average mid-lower leg skin temperature (LT) against RT yielded a correlation coefficient of +0.73. A lower limit confidence band (99th%ile) was then constructed around the 1 linear regression line derived from the data.

Six infants who were known to have disease related fevers were similarly studied. When plotted against the regression line, each infant's LT was found to be abnormally cool ( $p < 0.01$ ). These findings confirm the observation that in the face of fever, the presence of a low LT suggests a disease related etiology.

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SURVIVAL IN NECROTIZING ENTEROCOLITIS: A COOPERATIVE APPROACH. Arvin I. Philippart, Fredrick E. Rector, Vollrad J. vonBerg, and Ronald L. Poland (Spon. by Sanford N. Cohen). Wayne State University School of Medicine, Children's Hospital of Michigan, Departments of Surgery and Pediatrics, Detroit.

Prior reports of survival in neonates with NEC have contrasted results of operative versus nonoperative management. In the belief that a cooperative interdisciplinary approach would yield greater survival, we studied prospectively all neonates with NEC over a 24 month interval. All suspect neonates were evaluated by both neonatology and surgery. NEC was documented by ileus, bloody stools and pneumatosis and/or pathology in 73 cases. Twenty three additional survivors lacking pneumatosis were excluded. All were treated initially nonoperatively. Operation was performed only for complications of NEC using predetermined clinical criteria. The criteria differ somewhat from those previously reported. Of 41 treated nonoperatively, 30 (73%) survived. In 8 of the 11 deaths, operation was refused because of irreversible brain, cardiac or renal disease raising medical mortality inordinately. Of 32 operated cases, 26 (81%) survived. In 2 of 6 deaths no attempt at salvage was made. Survival of all infants with NEC was 77%.

The important measure of management protocols is survival of all infants with NEC rather than a comparison of medical and surgical results. This sizable series demonstrates that improved survival can result from use of predetermined protocols.

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EFFECT OF PHOTOTHERAPY ON 25-HYDROXYVITAMIN D (25-OHD) Serum. Arun K. Pramanik\*, Gary M. Chan and Reginald C. Tsang, Dept. of Ped., Univ. of Cincinnati & Univ. of Arizona.

Ultraviolet (UV) irradiation of skin activates the conversion of provitamin D to vitamin D<sub>3</sub> which is subsequently hydroxylated to 25-OHD. Phototherapy might increase the UV irradiation received by infants, with possible effects on neonatal vit D status. Eight fullterm, appropriate for gestation infants receiving phototherapy for physiologic jaundice were pair-matched for race and postnatal age with 8 controls. All infants had 5-minute Apgar score > 6 and were on the same milk formula. Blood samples were obtained prior to, at the midpoint and after 48 hours of phototherapy (or corresponding ages in controls). Irradiance was measured inside the isolette with a Research radiometer at 30 cms from the radiant source (8 GE, 20 watt daylight fluorescent lamps). Irradiance in the UV wavelength was low and ranged from 0.1 to 1.7 X 10<sup>-7</sup> watts/cm<sup>2</sup>/nm compared with the blue wave length irradiance of 6 to 18 X 10<sup>-7</sup> watts/cm<sup>2</sup>/nm. In phototherapy treated infants, serum 25-OHD, (Belsey's method, normal 13 to 81 ng/ml) was 56±3 (mean±SE), 53±3 and 51±4 for pre-, during and post-therapy samples respectively (paired t, not significant); serum Ca was 10.1±0.2, 10.3±0.4 and 10.0±0.2 mg/dl (NS); serum bilirubin was 11.5±0.7, 10.8±0.5, 8.6±0.6 ( $p < 0.001$ ). In control infants, serum 25-OHD, Ca and bilirubin did not change over the period studied. Average daily vit D intake for phototherapy and controls was 141±6 vs 180±20 I.U. (NS). Thus, ultraviolet irradiation from conventional phototherapy is minimal and does not significantly affect serum 25-hydroxyvitamin D levels in infants.

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IN VIVO PROPERTIES OF THE SKIN OF INFANTS. Joseph B. Philips, Harold Alexander, Edwin G. Brown and Francis E. McDonnell (sponsored by Avron Y. Sweet). Department of Pediatrics, Mount Sinai School of Medicine, New York, and Medical Engineering Laboratory, Stevens Institute of Technology, Hoboken, New Jersey.

A procedure has been developed for biaxially loading and subsequently measuring and calculating stress vs. strain curves for *in vivo* human skin. The stress-strain-time response of skin was measured in normal newborn infants to evaluate its visco-elastic properties. This has been done to establish normal values for comparison with skin of infants with dehydration and other problems which affect skin properties. The data are expressed in terms of 2 material constants, C and K, which have been mathematically derived and validated in young human adults. C and K represent the low and high stress components of stress-strain curves respectively. The low stress segment of the curves previously has been shown to be determined by the ground substance and elastic fiber components of the skin and the high stress segment is determined by the collagen fiber network. From tests performed on the upper back, chest, abdomen and thighs of full term normal newborns, normal values of C and K have been established. These appear to be similar to those obtained from the skin of young adults. These established values in normal infants serve as a basis for comparison of findings in low birth weight infants and those infants with dehydration, edema and local trauma due to electrodes used for monitoring.

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ABDOMINAL DISTENSION IN INFANTS ON PHOTOTHERAPY.

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We noted that infants undergoing phototherapy (Ph<sub>x</sub>) often develop abdominal distension, and thus undertook a study to evaluate possible mechanisms for this distension. 20 infants on continuous Ph<sub>x</sub> with standard methods of eye occlusion were compared with two control groups - jaundiced infants not on Ph<sub>x</sub>, and healthy non-jaundiced infants. The abdominal circumference was measured prior to feeding. Treated infants exhibited an increase in abdominal circumference ranging from 1-4 cm (mean 2.5) compared with 0-1 cm (mean 0.5) in each of the two control groups; distension was noted within 8-12 hours, reaching a maximum by ca 24 hours.

In 4 infants intermittent Ph<sub>x</sub> with intermittent eye occlusion (16 hrs. on, 8 hrs. off) resulted in intermittent abdominal distension during light periods, with a mean increase in circumference of 1.9 cm. In 15 additional infants in whom eye occlusion (and Ph<sub>x</sub>) was discontinued during all feeding periods and re-applied after feeding, abdominal distension still developed (1-3 cm, mean 2.3).

Preliminary studies were performed in which infants on Ph<sub>x</sub> did not have their eyes occluded but had their faces shielded by a black screen; abdominal distension did not develop. Subsequent eye occlusion did produce abdominal distension, suggesting that the distension was the result of eye occlusion rather than the direct result of Ph<sub>x</sub>. These findings may be significant in evaluating other sequelae of Ph<sub>x</sub>, e.g. behavioral changes.