17 CARDIOVASCULAR AND ONCOTIC EFFECTS OF ALBUMIN INFUSION IN PREMATURE INFANTS.

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Controversy surrounds the use of colloid infusions in sick, premature infants in need of circulatory support. We set out to determine the oncotic and cardiovascular effects of a standardised human albumin infusion (1.2G/Kg over 2 hours) in 12 premature infants on 18 occasions when hypovolaemia was suspected on clinical grounds.

Blood volume (BV) was increased by a mean of 13.6% by the end of infusion but showed a wide variation. BV fell thereafter, reaching baseline values from 2 hours after infusion. Albumin concentration and colloid osmotic pressure rose pari passu and remained raised even when BV had returned to preinfusion values.

Blood pressure (BP) rose in 3 cases only and heart rate (HR) fell where the preinfusion HR exceeded the mean for the group. BP variability (measured as the c.v% over 20 cardiac cycles) fell even when muscle paralysing agents were in use.

We conclude the albumin has a useful, though variable effect on increasing BV and that acute volume expansion can temporarily stabilise blood pressure fluctuations.

18 BLOOD-BRAIN BARRIER/BBB/ PERMEABILITY AND VASCULAR REACTIVITY TO BRADYKININ/BK/ AFTER PRETREATMENT WITH DEXAMETHASONE/DXM/

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The pathophysiological role of BK is increasingly recognized in cerebral ischemia and trauma. We studied whether DXM interferes with the BK-dependent effects on the BBB. Pia-arachnoidea vessels were studied by fluorescens microscopy in cats. BK in rising cc. /4x 10^{-8}- 4x10^{-3}M/ were used as superfusion media. Cats received DXM 1 or 5 mg/kgbw, resp. 5 hrs prior to exposure to BK. Na^{+}-fluorescein /MW:376/ iv served as BBB indicator. DXM did neither influence opening of the BBB by BK nor the dose-effect relationship of this process. However, 1mg blunted the vasodilatory response to BK, whereas 5 mg resulted in a regular dilatory reaction although the arterioles did not reconstrict again at higher BK-cc. After pretreatment with DXM /1 or 5 mg/ pial veins were found to significantly dilate to BK. Taken together, DXM does not prevent opening of the BBB to BK but it influences the vasomotor response to the vasoactive peptide.

19 ANALYSIS OF PENTANE AND ETHANE: A POSSIBLE METHOD FOR QUANTITATION OF FREE OXYGEN RADICALS

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It has been claimed that free radicals play a role in the pathogenesis of a variety of diseases. This hypothesis has not been tested owing to methodological difficulties. Here we describe a simple, accurate method that quantitates lipid peroxidation. - Peroxidation of membrane lipids results in formation of ethane and pentane (Science 183:208,1974). In the present study air was collected from closed reaction vessels. The head space was introduced through a trap (Porasil C, mesh 80/100) in -110°C. Porasil C was eluted at 120°C to a capillary column (Chrompack Al 203-KCl), and analyzed by gas-liquid chromatography. The method was verified using following systems. 1. Under oxidizing conditions liposomes containing linolenic acid produced ethane, and linoleic acid formed pentane. 2. Inert atmosphere or superoxide dismutase + catalase (SOD+Cat) inhibited the gas formation by 95 and 50%, respectively. 3. Activation of human neutrophils by phorbol-13-acetate activated pentane formation. SOD+Cat reduced pentane by 80%.- According to present results lipid peroxidation is inhibited by free radical scavengers. Analysis of ethane and pentane in expired air may help to estimate the importance of free radicals in pathogenesis of various diseases.

20 THE NUCLEPORE FILTER HOLDER: A NEW METHOD FOR CELL MIGRATION TEST

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Several methods have been introduced for the assessment of chemotactic activity of mononuclear and polymorphonuclear leucocytes /PMNs/. These techniques mostly base on the original assay of Boyden. We have recently devised a simple migration test modifying a commercially available Nuclepore filter holder /NFH/ and filter membrane /pore diameter 5 µm, pore length 10 µm, Nuclepore Corporation, Pleasanton, USA/. The upper compartment of the NFH is loaded with 100 µl of isolated human PMNs suspended in Hanks' balanced salt solution. The lower compartment contains 400 µl of the same suspension medium with or without chemoattractive agent. The loaded NFH is incubated at 37 C for 45 minutes. Then, the content of lower compartment is aspirated and the concentration of PMNs is counted in this suspension. Preliminary experiments show the usefulness of the method which is highly sensitive to distinguishing random and directed migrations /mean factor 3.2±0.5/. The coefficient of variation was between 12 and 18% using same suspensions.

21 PREDICTION OF NEURODEVELOPMENTAL DISABILITY AT 4 YEARS FROM BRAIN ULTRASOUND APPEARANCE IN VERY PRETERM INFANTS.

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We have previously shown that neurodevelopmental progress at 1 year of age could be predicted with reasonable accuracy from brain ultrasound scans in a 5-year cohort of infants born at less than 33 weeks of gestation(1). We now report prediction of outcome at 4 years of age in the 172 infants born in the first 3 years of this study, 1979-'81. The results showed that the probability of a major disorder was 8% (95% confidence interval 4-14%) in 130 infants whose scans at discharge from the neonatal unit were 'favourable', i.e. gave no evidence of ventricular dilatation, hydrocephalus or cerebral atrophy (loss of brain tissue from any cause). By contrast, the probabilities of a major disorder were 38%(15-65%) in 16 infants with ventricular dilatation and 60%(30-84%) in 15 infants with hydrocephalus and/or cerebral atrophy.

We conclude that predictions of outcome based on findings at 1 year have in general been confirmed.

1. Stewart,A.L. et al. Dev Med Child Neurol., 1987; 29: 3-11.

22 PROGNOSIS OF INFANTS WITH HYPOXIC-ISCHAEMIC BRAIN INJURY ASSESSED BY MAGNETIC RESONANCE SPECTROSCOPY.

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The brains of 31 infants born at 31-42 weeks' gestation and suspected of hypoxic-ischaemic brain injury were studied within 5 days by phosphorus magnetic resonance spectroscopy to assess the prognostic significance of abnormalities of oxidative phosphorylation. Control data were collected from 30 normal infants born at 28-42 weeks' gestation. The surviving infants were examined by independent observers at approximately 12 months of corrected age. All 5 infants suspected of brain injury whose adenosine triphosphate (ATP)/total phosphorus (Ptot) values were below the 95% confidence limits for normal infants died. 10 of the 18 infants whose values for phosphocreatine (PCr)/inorganic orthophosphate (Pi) were below confidence limits died and 7 of the 8 survivors had major neurodevelopmental disabilities. By contrast only 1 of the 13 infants with a normal value for PCr/Pi died and 1 had major disabilities.

We conclude that low ATP/Ptot values signified fatal energy failure and low PCr/Pi values indicated a very high risk of major neurodevelopmental disabilities in survivors.