

### LONGITUDINAL MEASUREMENTS OF TOTAL BODY WATER AND GROWTH IN LOW-BIRTH-WEIGHT INFANTS. Riccardo E. Pfister, Jean-Léopold Michell, Yves Schutz and Eric Jéquier - Department of Neonatology, Institute of Physiology, University of Lausanne, Lausanne, Switzerland

**AIM:** Longitudinal investigation of early postnatal growth and changes in total body water in "healthy" low-birth-weight infants.

**METHODS:** 9 preterm infants (birth-weight:  $1290 \pm 175$  g, gestational age:  $30 \pm 0.8$  wks) were studied on postnatal day 4, 11 and 18 using the established technique of  $H_2^{18}O$  dilution: administration by nasogastric tube with analysis of  $^{18}O$  enrichment in urine by mass-spectrometer. Weight, length and skinfolds were measured simultaneously. Weight gain was calculated in g/kg/d. Effective fluid (ml/kg/d) and energy (kcal/kg/d) intakes were recorded daily.

**RESULTS:** given as mean  $\pm$  SD; \* =  $p < 0.05$  versus day 4 value

| day | energy        | fluids       | weight gain     | length (cm)    | skinfold <sup>§</sup> | TBW (%)        |
|-----|---------------|--------------|-----------------|----------------|-----------------------|----------------|
| 4   | 64 $\pm$ 18   | 154 $\pm$ 45 | -15.5 $\pm$ 8.1 | 39.3 $\pm$ 2.1 | 100                   | 81.3 $\pm$ 3.3 |
| 11  | 108 $\pm$ 20* | 147 $\pm$ 22 | 8.0 $\pm$ 7.3*  | 40.0 $\pm$ 2.0 | 95 $\pm$ 4            | 81.1 $\pm$ 4.3 |
| 18  | 111 $\pm$ 8*  | 131 $\pm$ 10 | 12.1 $\pm$ 3.7* | 40.8 $\pm$ 2.1 | 103 $\pm$ 9           | 81.2 $\pm$ 6.3 |

<sup>§</sup> sum of 5 skinfolds as percentage of day 4 value

**CONCLUSION:** Independent of infants' weight changes and independent of large variations in fluid intake, TBW remained remarkably constant from postnatal day 4 to day 18. This is in contrast with the concept that changes in body weight during the first days of life reflect the state of hydration. Weight loss and subsequent weight gain affect TBW and dry body mass equally. Initial weight loss may be therefore interpreted as the result of "starvation" and weight gain the result of refeeding.

**SPECULATION:** Could higher early energy intakes prevent initial weight loss, considered so far as "physiologic"?

**ACCURACY OF NURSE CHARTING IN A NEONATAL INTENSIVE CARE UNIT.** Steve Cunningham, Sarah Deere, Rob Elton\* Neil McIntosh. Dept of Child Life & Health, Dept of Health & Medical Statistics, University of Edinburgh, EH9 1UW, U.K.

Neonatal nurses typically record hourly data of heart rate (HR), blood pressure (BP) and other physiological parameters from the monitors on sick infants. This recording is time consuming and is collected at variable times depending on the nurses' other duties. We wished to evaluate the accuracy of this nursing practice.

**Methods:** 37 infants who required intensive care were studied during the first 48 hours of life. Each infant was connected to a computerised cot monitoring system which accessed data every 1 second and gave a median and mean value each hour. Any artifact (<6.9% data) is excluded. The difference between the computer median and the nurse record each hour over the first 48 hours gave a mean difference value (a measure of nurse accuracy) and a standard deviation (a measure of precision).

**Results:** Although the differences (m,SD) between nurse and computer values were highly significant - PO<sub>2</sub> (0.22,1.08) kPa, HR (3.91,8.37) per min, mean BP (0.92,3.80) mm Hg and T (0.75,0.46) $^{\circ}$ C; (all  $p < 0.001$ ), with the nurses tending to chart higher, only the temperature difference is clinically important.

**Conclusion:** a computer can access hourly information as accurately as experienced neonatal nurses.

**A NEW METHOD FOR EVALUATION OF FETAL GROWTH FROM SIZE AT BIRTH.** Aimon Niklasson and Petter Karlberg. Department of Pediatrics I, University of Göteborg, Göteborg, Sweden.

A new method for evaluation of weight (BW) in relation to length (BL) (leanness/fatness) in the newborn infant is presented using standard deviation score for BW (BWSDS) and for BL (BLSDS) normalized for sex, gestational age (GA) in a linear regression model, based on all Swedish "healthy" singletons 1986 (n=79,976).

**Result:** A continuous variable called LEANSDS was found with intercept=0, regr.coef.=0.715, SD=0.699 and r=0.72 irrespective of sex and GA (34-43 weeks). It was tested on the 1985 years cohort with good fit. A chart is constructed which simplify visual evaluation. Using -2SD as cut off lines about 1/3 of the infants light for date (LFD) are also lean but 2/3 of the lean infants are not LFD. In stillborn infants the proportion of lean not LFD infants is increased 13 times, in early neonatal deaths 2.6 times. Other methods based on GA dependent regression of BW on BL or ponderal indices are more complex.

**Conclusion:** A continuous LEANSDS variable which can be added for further processing unlike percentiles will together with BWSDS and BLSDS improve evaluation of for example intrauterine growth retardation from size at birth in proportionally small (extreme stunting) and in lean (extreme wastage).

**INTESTINAL DISTRIBUTION AND LEAKAGE OF HYALURONAN AFTER SMALL BOWEL TRANSPLANTATION.** Wallander J, Johnson C, Meurling S, Knutson L, Gerdin B, Hällgren R, Tufvson G. Departments of Pediatric Surgery, Surgery, Medicine and the Transplantation Unit, University Hospital, Uppsala, Sweden.

The accumulation, distribution and luminal secretion of hyaluronan (hyaluronic acid; HA) was demonstrated at different times after small bowel transplantation experimentally, and in one clinical case. Semi-allogenic or semisyngenic rat models were used to elicit either unidirectional graft rejection or graft-versus-host disease. During graft rejection a cellular infiltrate and edema appeared in the lamina propria in the crypt are where an accumulation of HA was also demonstrated. There was progressive accumulation of HA in the small bowel during rejection and on day 6 there was a three-fold increase compared to the values in syngenic grafts. The increase in tissue HA was paralleled by an increase in the total water content of the rejecting graft. Measurements of the luminal secretion of HA in rejection grafts at day 6 revealed a five fold increase at this time. In specimens from animals suffering from GVHD, no significant changes in water of HA content and distribution were observed until day 12. In a clinical case of small bowel transplantation in a 14 months old child, luminal secretion of HA was measured in the graft by using a segmental intestinal perfusion technique. A more than 30 fold increase of secreted HA was noted, which was directly paralleled by clinical and histological signs of graft rejection. The data suggest that accumulation of HA might contribute to the pathophysiology of the transplantation edema and that HA might be of potential diagnostic value for monitoring purposes after small bowel transplantation.

**EVOLUTION OF THE INTESTINAL GRAFT AFTER MULTIPLE ABDOMINAL VISCERA TRANSPLANTATION (MAVT).** Umberto Simeoni, Karim Boudjema, Stephan Geiss, Marie-Pierre Chenard, Angelo Livolsi, Philippe Deprez, Philippe Wolf, Michel Fischbach, Daniel Jaeck, Jacques Cinqualbre, Jean Geisert, Hôpital de Haute-pierre, Strasbourg, France.

MAVT has been proposed for the treatment of irreversible hepatic dysfunction secondary to the neonatal short bowel syndrome and total parenteral nutrition. Evolution of the intestinal graft after MAVT in two male, 18 and 10 month old infants was studied by means of nutrient absorption rates and periodical endoscopic and histologic examination. The graft comprised the liver, the stomach, the duodeno-pancreas and the jejunum in one case or the small intestine and a part of the colon in the other case. Immunosuppression included antilymphocyte-globulins, corticosteroids, azathioprine and ciclosporin.

In both cases, 2 and 3 months after MAVT, intestinal biopsies revealed irregularly located inflammatory lesions of the mucosa, consisting of a multicellular infiltrate and villous atrophy, whereas previously described, typical aspects of small bowel rejection were not observed. Near-normal nutrient absorption (absorption rate for carbohydrates: 97%) was achieved despite the development of these lesions in one infant, who deceased of intractable sepsis on the seventh month. The second patient is presently treated with high doses of corticosteroids after unsuccessful OKT3 therapy.

These observations may be consistent with a particular form of acute intestinal rejection, associated with MAVT.

**EFFECT OF MORPHINE INFUSIONS ON PLASMA CATECHOLAMINES IN VENTILATED NEONATES.** Neil McIntosh, Steve Cunningham, Sherry Wright\*, Rhona Stephen. Dept Child Life & Health, University of Edinburgh and Dept of Pharmacy\*, Royal Infirmary, Edinburgh, EH9 1UW, U.K.

We wished to determine whether stress in ventilated newborns was reduced by morphine infusions.

**Methods:** 26 sick neonates requiring ventilation were given a loading dose of Morphine (50 or 150 ug/kg) followed by a constant infusion (10 ug/kg/hr). Plasma catecholamines (HPLC) were measured before, during and after the infusions.

|                             | BEFORE | POST INFUSION |      | POST-INF |      |      |     |
|-----------------------------|--------|---------------|------|----------|------|------|-----|
|                             |        | INFUSION      | LOAD | 12hr     | 24hr | 48hr |     |
| Noradrenaline median-nmol/L | 3.2    | 2.1           | 1.7  | 1.3      | 2.3  | 1.6  | 5.6 |
| low quartile                | 1.4    | 1.1           | 0.9  | 1.0      | 1.2  | 1.3  | 1.8 |
| high quartile               | 7.0    | 3.6           | 3.7  | 1.7      | 3.0  | 4.3  | 7.6 |

There is a significant reduction ( $P < 0.05$ ) of noradrenaline levels during the infusions. No complications referable to the infusions were noted and with the small numbers, no difference was found between the 2 loading doses.

**Conclusions:** morphine infusions significantly reduce the neurochemical stress response to ventilation in newborn infants.