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THE INTERRELATIONSHIP BETWEEN LINOLEIC AND LINOLENIC ACIDS IN NEONATES MAINTAINED ON TPN INCLUDING SAFFLOWER OIL. N.P. Simon, D.H. Adamkin, (Sponsored by B.F. Andrews). Univ. of Louisville, Dept. of Pediatrics, Louisville, Ky.

An investigational 20% safflower oil emulsion with increased linolenic acid (3±1.5%) was evaluated in ten neonates and compared to a control group of ten receiving 20% safflower oil (0.1% linolenic). A subgroup of five study patients and four controls had received 10% safflower oil prior to the study and were evaluated separately. Mean birthweight for all groups was 1.5kg. Serum fatty acid (FA) profiles were done prior to and after completion of 7 days of fat therapy. Below are fatty acid levels for those infants who had not received previous lipid. (expressed as % total FA)

| Control n | Linoleic(L) | Linolenic | Arachidonic(A) | L/A |
|------------|-------------|-----------|----------------|-----|
| Baseline 5 | 8.5 | 0 | 10.3 | 0.8 |
| Completion | 19.4 | 0 | 11.3 | 1.9 |

Study
Baseline 6 11.1 0.1 11.7 0.7
Completion 32.8 0.6 8.8 3.8*(p<0.05)
The subgroup infants who had received 10% safflower oil prior to entering the study had L/A ratio changes that were not statistically different from the control group above. Safflower oil with added linolenic acid appears to inhibit the conversion of linoleic acid to its metabolites as evidenced by a significantly increased L/A ratio. This inhibition was not apparent by L/A ratio in those neonates who had previously received safflower oil.

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CA AND P REGULATING HORMONES DURING THE 1ST YR OF LIFE: A LONGITUDINAL PROSPECTIVE STUDY Jean J. Steichen, Reginald C. Tsang, William Brazerol, Dept. Pediatrics, Univ. of Cincinnati

Ca and mineral requirements in term and premature infants are the subject of recent studies. We proposed to establish reference values for Ca and P regulating agents in healthy term formula fed infants. Ca, iCa, P, Mg, 1,25(OH)₂ vitamin D (1,25D), 25 OH vitamin D (25D), parathyroid hormone (PTH), calcitonin (CT) and alkaline phosphatase (Alk Phos) were measured in 24 healthy term infants at 2,4,6,12,18 wks and 6, 9, 12 mo. All were exclusively formula fed (Similac 20-Fe) for the first 6 mo, when Gerber baby food was added for all. Mothers kept a 3d/wk record of all intake. In addition grps of infants receiving soy milk, human milk or a whey predominant formula were studied. Ca, Mg, iCa did not change significantly over the 1st yr of life, P decreased. PTH and CT did not change; Alk Phos 25OHD and 1,25OHD increased slightly. By preliminary analysis, whey predominant formula were not different from Similac fed infants. Soy milk infants showed significant differences compared to casein or whey formula fed infants.

| | 2 Wks | 6 Wks | 12 Wks | 6 Mo | 9 Mo | 12 Mo |
|-----------------|--------|--------|--------|--------|--------|--------|
| 25D (ng/ml) | 31±11* | 41±17 | 43±17 | 47±17 | 46±9 | 47±11 |
| 1,25D (pg/ml) | 50±27 | 66±25 | 60±25 | 50±28 | 60±26 | 52±20 |
| Alk Phos (IU/l) | 117±25 | 167±38 | 155±29 | 140±26 | 148±31 | 150±22 |
| CT (pg/ml) | 39±20 | 30±21 | 26±20 | 30±22 | 23±22 | 56±27 |
| PTH (uIEq/ml) | 62±25 | 56±30 | 40±20 | 45±25 | 44±14 | 53±24 |

This provides a basis for data comparison in mineral nutritional studies in the 1st yr of life. (*=±S.D.)

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REMOVAL OF PLUTONIUM FROM NEONATAL RATS BY CHELATION THERAPY. Maurice F. Sullivan and Victor H. Smith (Spon. by Otakar Koldovsky), Battelle, Pacific Northwest Laboratories, Department of Biology and Chemistry, Richland, Washington.

Two-day-old rats injected intragastrically (i.g.) with ²³⁸Pu nitrate absorb about 100 times more ²³⁸Pu than adult animals. The mucosa of the small intestine retains about 10 times more Pu than is absorbed during the first week after gavage. To determine if chelate therapy is effective for removing deposited Pu or Pu retained in the mucosa, groups of rats were given ²³⁸Pu intragastrically and then treated with Ca-DTPA, either i.g. or parenterally, 2 hours (prompt) or 5 days (delayed) later. When the rats were killed, we found that the ²³⁸Pu in the intestine was reduced from 18% of the Pu dose to about 2% by prompt treatment. Delayed treatment also reduced the amount in the gastrointestinal (GI) tract, to about 15% of untreated controls. Although DTPA is not well absorbed from the GI tract of adult rats, it was about as effective for removing Pu from the neonate when given by gavage as it was when given parenterally. Prompt DTPA treatment reduced the quantity of ²³⁸Pu retained in the skeleton, liver and soft tissue to about one-third of the untreated control value; delayed treatment reduced it to about one-half the control value. Treatment by the parenteral route was more effective for removing Pu from bone. The results suggest that ²³⁸Pu retained in the mucosa of the GI tract is loosely bound; consequently, chelate therapy is more effective in the GI tract than in the skeleton, where the ²³⁸Pu retained is more firmly bound.

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GASTRIC MOTILITY AND GI BLOOD FLOW: EFFECTS OF HYPOXEMIA IN THE NEWBORN PIGLET. Joanne S. Szabo, Barbara S. Stonestreet, William Oh, Brown Univ., Women & Infants Hosp., Dept. of Ped., Providence, RI

We studied the effects of hypoxemia on gastric motility & GI blood flow in nine 2-4 day old piglets by determining gastric emptying (phenol red dye dilution), GI blood flow (QGI, radio-labelled microspheres), O₂ delivery (DO₂GI), O₂ extraction (O₂ExGI), & O₂ consumption (VO₂GI). Animals were mechanically ventilated (N₂O anesthesia), & studied during control (PaO₂91±8 torr), 35 minutes of hypoxemia (29±1 torr), and recovery periods (90±5 torr) (mean±SEM). Following a D₁₀W test meal (22ml/kg), gastric residual volumes were determined at 10-min. intervals over 30-min. study periods. The hypoxic emptying pattern showed significantly greater gastric residuals (p<0.05) at 20 min. compared to 10 min.; however, residual volumes were not significantly different among groups at 10, 20, & 30 min. Thirty minutes following the test meal, the QGI and O₂ transport showed:

| | Q GI+(9) | DO ₂ GI+(7) | O ₂ ExGI%(7) | VO ₂ GI+(7) |
|-----------|----------|---|-------------------------|------------------------|
| control | 126±15* | 14±1* | 27±3 | 3.6±0.5* |
| hypoxemia | 83±18 | 3±1 | 58±10 * | 1.5±0.4 |
| recovery | 117±15 | 11±2 | 22±3 | 2.2±0.4 |
| mean±SEM | ()=n | +ml·min ⁻¹ ·100g ⁻¹ | *p<0.01 vs. control | |

DO₂GI fell because of decreased QGI & hypoxemia. The increased O₂ExGI did not compensate for the decreased DO₂GI; therefore, VO₂GI fell. We speculate that the significantly altered gastric emptying pattern and decreased QGI and VO₂GI produced by hypoxemia may account for feeding intolerances seen in hypoxic newborns.

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THE EFFECT OF NONNUTRITIVE AND NUTRITIVE SUCK ON GASTRIC EMPTYING IN PREMATURE INFANTS. Joanne S. Szabo, A. Craig Hillemeier, William Oh, Brown Univ., Women & Infants Hosp., Dept. of Ped., Providence, RI

Nonnutritive and nutritive suck were compared to nasogastric gavage feeding in 10 preterm infants (33-36 wks) to determine the effect of suck and swallow on gastric emptying patterns. We used a 10% dextrose meal with phenol red marker (22 ml/kg) to determine gastric emptying, based on a double sampling technique, at 10-minute intervals for a 30-minute test period. A cross-over study design compared the effects of the three feeding methods (order randomly assigned) in each infant. When emptying patterns were compared, nasogastric feeding led to a more consistent emptying trend, with 20- and 30-minute residual volumes significantly decreased from 10-minute values (p<0.01). Nonnutritive and nutritive suck caused greater variability in the emptying pattern, particularly at the 20-minute sampling period, with significant reductions in gastric residuals by 30 minutes (p<0.01). However, the gastric residual volumes (ml/kg), which reflect gastric emptying pattern, did not differ significantly when comparisons were made among groups at 10, 20, and 30 minutes following the test meal. Nonnutritive and nutritive suck and swallow of a liquid dextrose meal does not significantly improve gastric motility and emptying in preterm infants; thus, the beneficial effect of suck and swallow on the nutritional status of preterm infants, demonstrated by others, is not related to improved gastric evacuation of feeds.

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BARIUM ENEMA: IS IT IMPORTANT IN THE EVALUATION OF CHILDHOOD CONSTIPATION. T. Taxman, B. Yulish, F.C. Rothstein (Spon. by J. Blumer), Dept. Ped. and Radiol., Case Western Reserve University, Cleveland, Ohio.

We question the importance of barium enema (BE) in the evaluation of childhood constipation. The radiographic appearance of a transition zone (TZ) or delayed evacuation of barium (DEB) on BE necessitates a second procedure, rectal suction biopsy (RSB). RSB is performed to confirm the presence of submucosal ganglion cells and rule out Hirschsprung's disease (HD). To determine if RSB alone is sufficient to evaluate the child with constipation, we retrospectively reviewed the charts of 76 children (1 day-18 yrs) with constipation who had BE & RSB. BE were reviewed for TZ, DEB and/or other colonic anatomic abnormalities (CAA). Seven children (9%) had CAA; 5 neonates (under 1 wk of age) with microcolon and 2 infants with previous history of NEC had colonic strictures. TZ was present in 23 patients (30%) and DEB in 26 patients (34%). Results of RSB are presented below:

| | GANGLION CELLS PRESENT | GANGLION CELLS ABSENT |
|-----|------------------------|-----------------------|
| TZ | 11 (48%) | 12 (52%) |
| DEB | 20 (77%) | 6 (13%) |

DEB is an unreliable radiographic sign for the diagnosis of HD; 77% of these children had normal RSB. In addition, the presence of a TZ is nondiagnostic of HD. Eleven (48%) children with suspected TZ had ganglion cells present on RSB. Three children with normal BE had no ganglion cells on RSB. A normal BE does not rule out HD. Therefore, infants over 7 days of age who have constipation and no previous NEC history or signs of intestinal obstruction can be adequately screened for HD by RSB without BE.