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Consumption of bioactive molecules protecting from necrotising enterocolitis in premature newborns receiving natural or pasteurised human milk

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The aim of the present study was to investigate, in very-low-birth-weight (VLBW) premature newborns susceptible to developing a necrotising enterocolitis (NEC), the consumption of bioactive molecules (DHA, sphingomyelin (SM), acid sphingomyelinase (Smase), and CD14) over 1 month, and to compare their levels in natural mother's milk (NM) *v*. pasteurised mother's milk from a milk bank (PM).

Nine VLBW premature newborn babies (<1 kg body weight, <32 weeks of gestational age) were followed up for 4 weeks after the commencement of digestive stimulation using NM or PM[(1)] (feeding rate 10–140 ml/kg body weight per d). A representative sample of the feeds was collected for a complete day in each week of the study. Milk lipids were extracted for lipid quantification[(2)], determination of the fatty acid profile (by GC) and identification and quantification of classes of phospholipid (PL; by ^{31}P NMR). Acid Smase activity was measured using radiolabelled SM[(3)] and CD14 was quantified using ELISA.

DHA levels were not different in NM and PM but were low compared with the nutritional recommendations (% total fatty acids; NM, 0.39 (SE 0.23; range 0.17–0.85); PM, 0.33 (SE 0.09; range 0.22–0.55)). The proportion of SM was similar between groups (28–30 % total PL) but levels varied among all milk samples from 0.07 mM to 0.17 mM. Consumption of SM varied from 3 to 27 mg/d; SM has been shown to have a beneficial effect on gut maturity at levels of 60–150 mg/d[(4)]. Acid Smase activity was significantly lower (30 %) in PM than in NM (pmol/h per ml; 215 *v*. 308 respectively; $P<0.01$), and soluble CD14 was not detected in PM while in NM the level ranged from 9 to 21 μg/ml, leading to a consumption of 0.4–3.3 mg/d.

The present preliminary study raises several questions: (1) what are the minimal amounts of each bioactive molecule that can protect against NEC; (2) is PM quality sufficient to protect against NEC; (3) what are the main reasons for the low level of DHA in the milk of these Mediterranean mothers (nutritional and/or genetic).

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