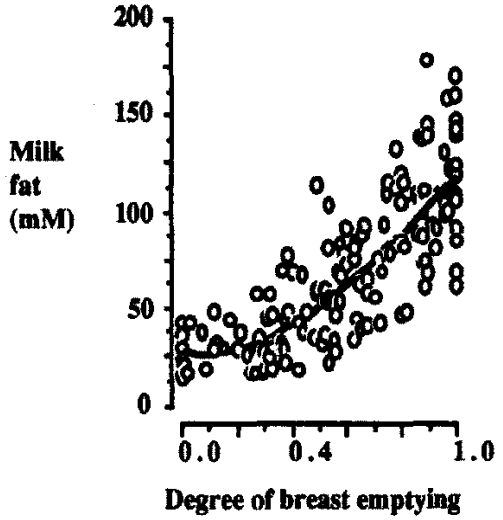
BREASTMILK FAT CONTENT INCREASES WITH THE DEGREE OF BREAST EMPTYING

S. E. J. DALY, J. C. KENT, C. S. ATWOOD, B. J. WARNER, D. Q. HUYNH*, R. A. OWENS*, and P. E. HARTMANN

Human milk varies greatly in fat content, both within a breastfeed and between breastfeeds. These changes have evaded adequate explanation. We have examined the changes in the fat concentration of milk as the breast is emptied using the Computerized Breast Measurement (CBM) system (Daly et al. 1992) which has been developed to measure breast volume. Using the CBM system we measured breast volume before and after every breast feed over two 24-hour periods for seven lactating mothers. Measuring breast volume before and after each breastfeed allowed determination of the volume of milk consumed by the infant at each breastfeed and the degree to which the breast was emptied of available milk at each breastfeed, measured on a scale of 0 to 1 (Daly et al. 1991). The breast volume changes (Daly et al. 1991) showed that the breast may contain variable amounts of available milk before each breastfeed and is not usually emptied to a consistent degree after each breastfeed. Milk samples (<2ml) were taken before (fore) and after (hind) each breastfeed by five mothers and assayed for fat content using a modified esterified fatty acid assay (Stern and Shapiro, 1953). Here we compare the fat content of each sample (y) (fore or hind, n = 154) against the degree to which the breast was emptied when the sample was taken (x) (see figure).



The relationship between concentration of fat in milk and the degree of emptying of the breast at the time when the sample was collected.

The polynomial $y = 27.6–27.7x+187.4x^2–68.5x^3$, $(0 \leq x \leq 1)$, explained 68% of the variability in fat content, showing that the amount of fat in the milk does rise steeply as the breast is emptied but only after approximately 40% of the available milk in the breast has been withdrawn. There were no statistically significant correlations between the amount of milk consumed by the infant and fore or hind milk fat content nor hind-fore difference. Many researchers have attempted to understand the intra- and inter-feed changes in milk fat content by relating these changes to the amount of milk consumed by the infant. Our data shows this approach to be simplistic as the amount of milk consumed does not necessarily correspond to degree of breast emptying (Daly et al. 1991, 1992). Thus we have shown how the concentration of fat in breastmilk increases in relation to increasing degree of emptying of the breast.

DALY, S.E.J., KENT, J.C., HUYNH, D.Q., OWENS and HARTMANN, P.E. (1991). Proc. 35th Ann.Confer. of Aust. Soc. Biochem. & Mol. Biol. 23: C10.
DALY, S.E.J., KENT, J.C., HUYNH, D.Q., OWENS, R.A., ALEXANDER, B.F., NG, K.C. and HARTMANN, P.E. (1992) Exp.Physiol. (in press).
STERN, I. and SHAPIRO, B. (1953). J. Clin. Pathol. 6: 158.

Dept of Biochemistry, *Dept of Computer Science, The University of Western Australia, WA 6009