

DETERMINATION OF THE SODIUM CONTENT OF HUMAN BREAST MILK USING AN ION SELECTIVE ELECTRODE

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Although there is currently much attention being paid to the presence of drugs in human breast milk, there is also concern regarding the optimal sodium intake in early infancy (Taitz 1977). Ansell et al (1977) have confirmed earlier findings in showing an initially high sodium level in breast milk ($21 \times 10^{-3}M$, days 1-5) falling throughout lactation ($12 \times 10^{-3}M$, day 10). As much as $280 \times 10^{-3}M$ sodium has been detected in the milk of a mother with cystic fibrosis (Whitelaw and Butterfield 1977).

As part of an investigation into some physical properties of human breast milk, (electrolyte content, microelectrophoretic mobility, globule size distribution) a sodium ion selective glass electrode (EIL type GEA33) was used to measure the Na^+ ion content in conjunction with a calomel reference electrode (EIL type RJ23) fitted with a remote microjunction containing saturated potassium chloride. Milk samples were diluted 1:1 with Tris/HCl buffer pH7.4 and measurements made in quiescent dispersions at $25.0 \pm 0.1^\circ C$. Standard sodium chloride solutions yielded an average calibration slope of $54.4 \pm 1.3mV$ for a tenfold change in Na^+ ion concentration (cf. Nernst slope of $59.16mV$). Some preliminary results obtained from 40 samples (10 subjects) are tabulated below.

Subject(s)	Period (day) of lactation	$Na^+ \times 10^{-3}M$
Non hypertensives	3 - 6	13.8 ± 2.1
" "	9 - 10	11.7 ± 1.2
" "	17	7.2
Clinically hypertensive:		
Subject 1	5	22.2
Subject 2	8	22.0
"	10	29.5
"	15 - 18	13.8 ± 3.0

The sodium results indicate an initially high level falling as lactation proceeds. Ansell (1977) commented that this may be an important defence mechanism against dehydration and hyponatraemia during a period of relative thirst and starvation. When it is considered that milk is derived from an intracellular source, and that high intracellular sodium is a predominant feature of hypertension (Patrick et al 1979), it might be reasonable to suspect that the initial high level is due to a hypertensive influence. Garay and Meyer (1979) have observed abnormal Na^+ and K^+ fluxes across the erythrocyte membranes of hypertensive patients. If a correlation between high Na^+ levels in breast milk and hypertension exists, the milk fat globule membrane may also exhibit such abnormalities.

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