

**Multiple factors in the hyperlipidaemia of
hypervitaminosis D**

SIR,—The interesting report of an inverse correlation between serum triglyceride and calcium levels in subjects over 60 by Dr Marianne Schroll and others (26 July, p 226) does not negate the epidemiological correlation of moderate hypervitaminosis D with increased serum cholesterol reported by one of us (12 April, p 87). Clinical studies of the hyperlipaemic effects of vitamin D in healthy adults¹ are in accord with the hyperlipaemia seen in infantile hypercalcaemia,² associated with hyperreactivity to vitamin D,³ and with hypervitaminosis D in rodents.^{4,5}

Hypocalcaemia can be caused not only by vitamin D deficiency but also by magnesium deficiency. A syndrome of hypomagnesaemia-hypocalcaemia that is unresponsive to administration of either vitamin D or calcium until the magnesium deficit is repaired has been reported in neonatal infants and in adults with chronic magnesium loss or malabsorption.⁶ Magnesium deficiency has been associated with hyperlipaemia,⁶ and vitamin D excess causes magnesium loss.⁷ It is possible that magnesium deficit may have contributed to the hypertriglyceridaemia of the hypocalcaemic patients reported by Dr Schroll and her colleagues.

The lower serum lipids in patients with higher serum calcium levels suggests that they may have been on diets rich in calcium. Calcium has been shown to interfere with fat absorption, thereby lowering blood cholesterol.¹ However, in a study⁸ of dietary and serum minerals and lipids in hard- and soft-water cities in Great Britain and the United States serum cholesterol and triglycerides were found to be higher in residents of both cities (London and Omaha) with hard water, despite the lower rates of ischaemic heart disease (IHD) there, than they were in the cities with soft water (Glasgow and Winston-Salem). In neither London nor Glasgow was the serum calcium high (2.14 and 2.18 mmol/l (8.57 and 8.70

mg/100 ml)). In both American cities the serum calcium was higher—particularly in the hard-water city (2.59 and 2.40 mmol/l (10.37 and 9.59 mg/100 ml)). Residents of both hard-water cities had higher serum magnesium levels than those of their paired soft-water cities. The difference was significant in Great Britain. (London/Glasgow, 1.25/1.07 mmol/l (2.50/2.14 mEq/l); Omaha/Winston-Salem 1.05/1.0 mmol/l (2.10/2.01 mEq/l.)) Whether the generally higher intake of calcium and vitamin D in milk in the United States than in Great Britain a contributory factor should be explored.

The possibility that magnesium deficiency might contribute both to the hyperlipaemia and the cardiovascular lesions of infantile hypercalcaemia and that deficiencies of vitamins A, B₆, and E might also participate was suggested in 1960.⁹ Reviewed elsewhere¹⁰ is further evidence that susceptibility to vitamin D excess may be intensified by deficiencies of other vitamins and of magnesium.

VICTOR LINDÉN

Institute for Community Medicine,
University of Tromsø,
Norway

MILDRED S SEELIG

Goldwater Memorial Hospital,
New York University Medical Center,
New York, USA

- 1 Lindén, V. *Scandinavian Journal of Social Medicine*. In press.
- 2 Forfar, J O, *et al*, *Lancet*, 1956, **1**, 981.
- 3 Seelig, M S, *Annals of the New York Academy of Sciences*, 1969, **147**, 537.
- 4 DeLangen, C D, and Donath, W F, *Acta Medica Scandinavica*, 1956, **156**, 317.
- 5 Hass, G M, *et al*, *American Journal of Pathology*, 1961, **38**, 289.
- 6 Seelig, M S, and Heggteit, H A, *American Journal of Clinical Nutrition*, 1974, **27**, 59.
- 7 Seelig, M S, in *Proceedings of First International Symposium on Magnesium Deficit*, Vittel, France, 1971, ed J Durlach, vol 1 p 11.
- 8 Berenbaum, M L, *et al*, *American Journal of Public Health*, 1973, **63**, 169.
- 9 Dalderup, L M, *Voeding*, 1960, **21**, 424.
- 10 Lindén V in *Proceedings of the Annual Meeting of the American College of Nutrition*, 1975, ed M S Seelig. New York, Spectrum Press. In press.