

LETTERS TO THE EDITOR

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THE MODE OF ACTION OF VITAMIN D

SEVERAL hypotheses have been put forward from time to time to explain the mode of action of vitamin D, but none accounts satisfactorily for all or most of the observed phenomena. The earlier view that vitamin D directly influences absorption of calcium from the intestine has been disproved by evidence published by Patwardhan and Chitre.¹ Sufficient evidence on the other hand is forthcoming to show that vitamin D influences the retention of calcium and phosphorus in the body and thereby maintains a proper balance between the needs of the bones and soft tissues. That the vitamin does not influence deposition of bone by local action has been demonstrated by Robison and Rosenheim² with bone slices in calcifying solutions. Under these circumstances the suggestion made by Harris³ that rickets is essentially a disease of blood rather than the bone seems to be worthy of consideration.

Investigation of the concentration of various chemical constituents of blood serum, viz., Ca, P (acid-soluble, total and inorganic), Mg, Cl, total protein, albumin and globulin, total base, etc., in rachitic and normal children showed that apart from calcium and phosphorus of the serum no other constituent underwent any change which could be attributed to the influence of vitamin D.

That calcium and inorganic phosphorus singly or together decrease in vitamin D deficiency is well known. The diminution of total [Ca] without a simultaneous fall in the quantity or a change in the nature of serum protein would result in a decrease of [Ca⁺⁺] of the serum [McLean and Hastings⁴]. This is followed by the fall of the ionic product of [Ca⁺⁺] × [HPO₄⁻] and [Ca⁺⁺]³ × [PO₄⁻²]² leading to a state of undersaturation of the plasma with regard to either of these salts. In 1941, Freeman and McLean⁵ showed that in induced rickets in puppies there existed a relation between the ionic product of [Ca⁺⁺] × [HPO₄⁻]

and calcification at the epiphysis. No such relationship could be found, according to them, with regard to the solubility product of Ca₃(PO₄)₂.

Our own observations on clinical rickets amply confirmed by a further study of experimental rickets in puppies show that, in fact, the calcification at the epiphyses and the solubility products of both the above salts are correlated. The critical values for the negative logarithms of the ionic products of [Ca⁺⁺] × [HPO₄⁻] and [Ca⁺⁺]³ × [PO₄⁻²]² have been observed to be 5.7 and 23.0 respectively. The corresponding values for rachitic children and vitamin D deficient animals lie above and those for normal children and control animals lie below the critical values. This observation on the influence of vitamin D on the ionic products is significant and the authors feel that it should be capable of being applied to test the state of nutrition with regard to vitamin D, especially as no such test exists at the present moment.

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1. Patwardhan and Chitre, *Ind. Jour. Med. Res.*, 1942, 30, 81. 2. Robison and Rosenheim, *Biochem. Jour.*, 1934, 28, 684. 3. Harris, *Lancet*, May 14, 1932. 4. McLean and Hastings, *Amer. Jour. Med. Sci.*, 1935, 189, 601. 5. Freeman and McLean, *Arch. Path.*, 1941, 82, 387.

THE COLORIMETRIC ESTIMATION OF HYDROXYLAMINE

THE several reactions which can be used for the qualitative detection of hydroxylamine have been reviewed by Blom (1928).¹ There exists, however, no satisfactory method for the quantitative estimation of this substance in biological material (cf. Lemoigne, *et. al.*, 1935).² We describe here a procedure which has been worked out for the colorimetric