

INFLUENCE OF DIETARY FACTORS
ON THE ENDOGENOUS CALCIUM
EXCRETION IN THE ALBINO RAT

EVEN on a calcium-free diet, there is a small but distinct negative calcium balance as evidenced by the results of Jones.¹ The measurement of this endogenous calcium excretion is necessary while studying the availability of calcium. It is known that protein, fat and phosphorus in the diet influence the absorption and utilisation of calcium.^{2, 3, 4} The effect of these dietary constituents on the endogenous calcium excretion in the white rat forms the subject-matter of this note. These data would be of value in studying the physiological inter-relationships that exist in the metabolism of calcium on the one hand and these dietary factors on the other.

Six healthy adult rats were taken and their normal endogenous calcium excretion was measured for a period of one week. During this period they were fed on a diet adequate in all respects but free from calcium.* After keeping them on a normal stock diet for one week they were given three other diets which apart from

(Values represent calcium excreted in mgm. for a period of one week)

Rat No. and sex	Calcium free diet			Calcium and protein free diet			Calcium and fat free diet			Calcium and phosphorus free diet		
	Urinary	Faecal	Total	Urinary	Faecal	Total	Urinary	Faecal	Total	Urinary	Faecal	Total
1 M ..	6.3	23.6	29.9	5.3	29.9	35.2	7.8	38.7	46.5	9.7	38.8	48.5
2 M ..	5.8	20.3	28.1	5.9	25.1	31.0	6.2	35.1	41.3	9.6	37.1	46.7
3 M ..	7.5	25.1	32.6	7.2	30.4	37.6	8.6	39.8	48.4	10.2	86.5	49.7
4 M ..	4.9	22.1	27.0	5.6	27.8	33.4	7.2	36.1	43.3	8.1	35.2	43.3
5 M ..	5.6	25.6	31.2	5.6	29.2	34.0	6.7	37.2	43.9	6.5	32.7	39.2
6 M ..	5.4	19.8	25.2	5.9	20.6	26.5	7.2	30.4	37.6	7.5	31.6	89.1
Average	5.9	22.8	28.7	5.9	27.2	33.1	7.3	36.2	43.5	8.6	35.3	43.5

being free from calcium were deficient in protein, fat and phosphorus respectively. Between successive experimental periods the rats were kept on the normal diet for one week. The calcium excretion of the rats on these diets was also measured.

Urinary calcium was measured according to the methods of Shol and Pedley.⁵ Faecal calcium was estimated by the method of McCrudden.⁶ The data for calcium excretion of individual rats are given in the above table.

The effect of protein, fat and phosphorus on endogenous calcium excretion is evident from the above data. The absence of protein in the diet does not affect urinary calcium excretion. But faecal calcium and the total endogenous excretion are slightly increased. The withdrawal of fat or protein increases both urinary and faecal excretion. The faecal calcium particularly is increased to a very large extent.

These results therefore show that under conditions of calcium deprivation or very low calcium intake, protein and phosphorus have a calcium sparing action. They also lend support to the fact that for efficient calcium utilisation, moderate amounts of protein fat and phosphorus are necessary in the diet. The increased urinary excretion is due to the withdrawal of calcium from the bones leading to an excretion through the renal channel. The origin of the increased faecal excretion is not definite. Experiments are in progress to see whether this calcium has originated from the digestive juices or is due to the pouring in of calcium from the blood stream to the lumen of the gastro-intestinal tract as suggested by Steggarda, *et al.*⁷

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* The composition of the calcium free diet was, corn starch 51, cane sugar 20, coconut oil 10, casuin (freed from calcium according to Jones)¹ 15, and calcium free salt mixture 4. The diet was supplemented with vitamins A, D, and also the vitamins of the B complex group. The diet contained 6.2 mgs. calcium/100 gms.

1. Jones, J. H., and N. E. Cohn., *Jour. Nut.*, 1936, 11, 296. 2. McCance, R. A., Widdowson, E. M., and H. Lehmann., *Biochem. Jour.*, 1942, 36, 686 3. Jones,

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Note.—It is to be noted that the values for endogenous calcium excretion in the above cases are rather high being about twice as much as the figures reported by Jones. The traces of calcium present in the diet cannot however completely explain the rather higher calcium excretion in these cases.