

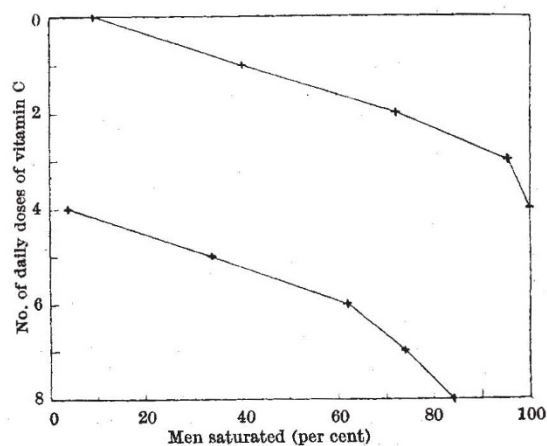
LETTERS TO THE EDITORS

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Vitamin C Saturation Test of Harris and Abbasy

DURING a year's service in the R.A.M.C., six months were occupied exclusively in carrying out and reporting upon this test¹ according to a scheme drawn up by the Directorate. Though the results concerning the 1,200 men examined cannot be given, some remarks on the method appear to be worth recording as based on experience gained in performing some thousands of titrations; also a couple of points accidentally discovered may be mentioned.

Much time is saved by having the fourth and fifth hours, after dosing with $\frac{3}{4}$ gm. of the vitamin, as the period of retention of urine and by making up the sample to $\frac{1}{2}$ or one litre, instead of having the often inconveniently long three-hour period and measuring the volume of each sample. The 2:6 dichloro-phenol indophenol reagent is best adjusted so that 1.0 ml. corresponds to 0.1 mgm. of vitamin. By these small alterations several weeks of simple arithmetic were eliminated in the second tour.



The method was found to give consistent results capable of distinguishing between groups of 100 men living under slightly different conditions of vitamin C intake. These differences are clearly shown when one plots on the vertical axis the number of daily doses required to approach saturation, namely, an excretion of 35 mgm. of vitamin in a two-hour period, and on the horizontal the total percentage of men who have reacted before and on that day. The forms of the curves are shown in the accompanying figure, in which the upper relates to a population extremely well supplied with vitamin C and the lower to a badly fed one, in which those with the lowest reserves are approaching frank scurvy; cases of scurvy require about ten doses to become saturated, and no information is given about the 16 cases below the 8-dose limit. These curves do not represent conditions in the Army. Their importance lies in the fact that they show an appreciable personal variation existing in a population on a fairly uniform diet, and make it clear why some, and not all, of a ship's company become affected with scurvy. Severe muscular exer-

cise is known to produce scurvy in those low in reserves of vitamin C, so possibly some men use up more than others, or minor differences in tastes or in cooking may be responsible.

There remains the question of the individual assimilation of the vitamin ingested. This may be very unequal. Information on this point was obtained through an accident. Two sections of men belonging to the same unit and feeding from the same cook-house responded very differently to the doses, for one showed its peak of saturation about two days earlier than the other. The numbers, 22 and 21 respectively, appeared to rule out a chance aggregation. This remained a puzzle until on returning to the station four months later it was ascertained that a visiting unit was dosed after the first section, and that the second home section had breakfast before being dosed. Apparently the vitamin suffers less destruction when taken after food. A direct experiment should be made to test this accidental finding.

Additional evidence was obtained that this vitamin, unlike vitamin D, is not stored in quantity for long. For it was found that those dosed at one station in May included about 40 per cent dosed four months previously. When three lists were prepared (a) those saturated in January, (b) all those previously dosed, (c) those not dosed before, three curves were obtained, roughly parallel, with a uppermost, then b and c, but only about $\frac{2}{3}$ of a dose separated a from c. Thus there were men in class c with much higher reserves than in a, though after a had been saturated all lived on the same diet.

W. R. G. ATKINS.

Dept. of General Physiology,
Marine Biological Laboratory,
Plymouth.
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¹Harris, *et al.*, *Lancet*, 1, 71 (1935); 2, 1429 (1937); 1, 642 (1942).

Vitamin C Saturation Test: Standardization Measurements at Graded Levels of Intake

DR. ATKINS's valuable account of his experiences with the saturation test prompts me to send a brief summary of my own unpublished observations bearing on two of the points to which he alludes: first, the degree of 'scatter' in the responses seen in different subjects kept on the same or similar intakes; secondly, the choice of criteria to be used.

In my own tests, groups of boys (12-36 in each group) at a residential home were kept on a basal diet of known vitamin C content and given in addition various graded supplements of vitamin C, natural and synthetic, over periods of 3-4 months or longer, so that each boy in a group received identically the same intake. About twice a year (an interval found to be sufficiently long to allow the effect upon their 'reserves' of any previous saturation test to have become negligible), the boys were tested by the standardized procedure previously described¹, 700 mgm. per 10 stone being given daily and the number of days counted until the approach of saturation (taken as an excretion of 50 mgm. or more per 10 stone in the 2½-hour specimen collected in the fourth and fifth hours after each test dose).

Results were found to be graded, as follows: daily intakes of 75, 60, 50 and 45 mgm. gave first-day responses of decreasing magnitude; 40 mgm., first to