Levels of Optimal Vitamin C Intake in Individuals as Estimated by the Lingual Tests (37649)

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The optimal levels of vitamin C intake in human individuals have been disputed ever since the isolation of the vitamin (1). On the one hand, the Food and Nutrition Board has set the recommended daily dietary allowances for vitamin C at 40 mg for children, 45–60 mg for adolescents, and 55–60 mg for adults. On the other hand, there are strong suggestions that the optimal levels of intake for the well-being of human individuals may be far above the recommended daily dietary allowances (1–3). Certainly optimal levels could also vary greatly from individual to individual (3, 4). It seems that a simple and rapid method for estimating how much vitamin C an individual needs would be highly desirable.

Methods. This report presents results of an attempt to apply the lingual ascorbic acid test reported by Giza and Weclawowicz (5), and also studied extensively by Cheraskin and Ringsdorf (6–8).

Volunteers, 47 in number, were recruited from staff members and students at the University of Texas. They were asked to follow their usual dietary habits except to avoid any ascorbic acid supplementation for 3 days prior to the tests. The tests were done in the early mornings under overnight fasting conditions. The technique was as described by Cheraskin and Ringsdorf with the modification of applying the 2,6-dichlorophenolindophenol reagent with a micropipette to obtain accurate drops of 0.01 ml in volume. The initial decolorization times of the 47 volunteers ranged from 8–65 sec. In three other volunteers, not included in the study, the droplet of reagent remained as such on the tongue and would not spread. Volunteers showing a long decolorization time (longer than 10 sec) were given ascorbic acid supplementations at graded levels: 500, 1,000, and 2,000; 3,000 and 4,000 mg if necessary, to decrease the decolorization time. These doses were continued for two days at each level. With those exhibiting a long decolorization time the tests were repeated every 3 days until one's shortest possible decolorization time was reached. The lowest levels of ascorbic acid intake at which an individual reached his shortest decolorization time was taken to indicate the optimal level of vitamin C intake for that individual.

Results. The major results of this study are summarized in Tables I and II.

Discussion. Up to the present time, the major methods for estimating adequacy of vitamin C intake have been by measuring plasma or leukocyte ascorbic acid contents, or by measuring the urinary excretion of the vitamin. It is known, however, that in comparison with other tissues, blood elements contain very low levels of vitamin C. Therefore they are poor samples for judging vita-

TABLE I. Distribution of Decolorization Times of Volunteers When No Supplementation of Vitamin C Was Given.

Decolorization time (sec)	Women	Men
Less than 10	2	5
10–14	5	9
15–24	6	7
25–39	3	3
40–65	3	3
Total	21	26

TABLE II. Levels of Ascorbic Acid Supplementations at Which Individuals Exhibited Their Shortest Decolorization Time (7–15 sec).

Ascorbic acid supplementation for two days (mg/day)	Women	Men
0	3	8
500	3	8
1,000	15	8
2,000		1[a]
4,000		1[b]
Total	21	26

[a] Smokes 10–15 cigarettes a day.

[b] Smokes about 20 cigarettes a day and was taking antibiotics frequently.

min C status of body tissues in humans. Since there is evidence that even in the same individual optimal level of vitamin C intake may vary greatly during one's lifetime, or even when merely under emotional and physical stresses, methods for estimating ascorbic acid status should be both simple and rapid so that periodic testing is possible. Measuring urinary excretion of ascorbic acid requires complicated arrangements and is therefore not suitable for this purpose. The lingual ascorbic acid test meets both requirements. Our study, although involving a small number of volunteers and a short term of ascorbic acid supplementation, seems to suggest: 1) There were great variations among individuals regarding their ascorbic acid status. This was strongly suggested by the wide span of initial decolorization times. 2) The shortest possible decolorization time (under fasting conditions) differs from individual to individual. This ranges from 7–15 sec. 3) Women as a group seem to require higher levels of vitamin C intake to exhibit a low decolorization time. 4) Moderate and heavy smokers seem to require much higher levels of vitamin C intake. Most volunteers were either nonsmokers or light smokers.

We hope that this report will stimulate interests for further studies of the method involving individuals in a large population of various age groups as well as supplementating the vitamin for a longer period of time.

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