

Vitamin C and the Common Cold: A Comment on the Review by Franklin C. Bing

A review of my book Vitamin C and the Common Cold, by Franklin C. Bing, was published in the JAMA for 1 March 1971.

I do not object to the expression by the reviewer of his opinions. I feel, however, that it is essential that the several untrue statements and thoroughly misleading statements that he makes be corrected.

The author states that "Unfortunately, many laymen are going to believe the ideas that the author is selling--that ascorbic acid is a completely harmless chemical which will prevent or mollify infectious diseases such as the common cold, if taken in doses of from one to ten gm daily throughout life, and possibly extend that lifetime from two to six years."

In fact, I do not state that ascorbic acid is a completely harmless chemical. I describe it as a natural, essential food that is nontoxic, and has far fewer side reactions than aspirin and other common cold medicines.

I do not recommend taking doses of from one to ten grams daily throughout life. Instead, I say that there is evidence that some people remain in very good health, including freedom from the common cold, year after year through the ingestion of only 250 mg of ascorbic acid per day, that the requirements of a few people for ascorbic acid may be expected to be even smaller, that for many people one gm to two gm per day is approximately the optimum rate of ingestion, and that for some people optimum health may require larger amounts, up to five gm per day or more.

The reviewer states that "Actually, when used as recommended by Professor Pauling, neither the safety of all dosage forms, nor the efficacy of ascorbic acid in any dosage form, has been proved."

In fact, I compare the evidence about the safety of ascorbic acid with that of the usual cold remedies, and conclude that the usual cold remedies are more dangerous than ascorbic acid.

Also, I present in my book a careful analysis of the controlled trials of ascorbic acid that have been published, and point out that several of these investigations have shown, with statistical significance, at the confidence level of 95 percent or higher, that ascorbic acid has value in decreasing both the incidence and the severity of the common cold. There has been no controlled study that has shown, with statistical significance, that ascorbic acid

administered regularly to a population exposed to cold viruses in the normal way does not have the amount of protective value that I describe for it, in my book.

The author states that "In reviewing published reports, Pauling explains negative findings by implying that positive results would have been obtained if larger doses of vitamin C had been employed." This statement is thoroughly misleading, in that it is correct only if it is applied to the published reports of investigations in which vitamin C was given to patients who had already contracted colds, or who had been subjected to the unusual insult of inoculation with large doses of cold viruses. The several published reports of controlled studies in which ascorbic acid is compared with a placebo, with both given during a period of time beginning before colds had been contracted and with subjects exposed to cold viruses in the normal way, have led to the statistically significant conclusion that ascorbic acid has protective value; that is, they have given positive results, rather than negative results. No controlled trials of this sort have given negative results with statistical significance, and it was not necessary for me to explain any negative findings for studies of this sort.

The reviewer states that "Pauling hopes that there will be a thorough, large-scale study on vitamin C and the common cold. Because he has already convinced himself that vitamin C in large doses does avert or ameliorate the common cold, the question arises: what kind of research does he have in mind?"

Here the reviewer has thoroughly misrepresented my statements, presumably because he has been careless in reading the book. On page 51 I say "So far as I am aware, no large-scale study, involving several hundred or thousand subjects, has been carried out to show to what extent the regular ingestion of ascorbic acid in large amounts is effective in preventing and ameliorating the common cold and associated infections. I hope that some such large-scale studies will be carried out; but in the meantime I am convinced by the evidence already available that ascorbic acid is to be preferred to the analgesics, antihistamines, and other dangerous drugs that are recommended for the treatment of the common cold by the purveyors of drugs."

I emphasize that I stated in my book that no large-scale study has been carried out to show to what extent the regular ingestion of ascorbic acid in large amounts is effective. The reviewer misquoted me, by omitting the statement about regular ingestion in large amounts. In fact, large-scale studies involving the regular ingestion of ascorbic acid in small amounts have been carried out, and have given statistically significant results, showing that even these small amounts are effective in preventing and ameliorating the

common cold and associated infections. The carelessness of the reviewer is made clear by the fact that on page 51 the sentences immediately preceding the sentences quoted above are the following: "In this chapter I have discussed some of the investigations that have been carried out on ascorbic acid in relation to the common cold; others are discussed in Appendix III. Some of these investigations have been well designed but, unfortunately, have involved the use of rather small quantities of ascorbic acid, and have shown only that these rather small quantities have limited value in preventing or ameliorating the common cold."

I find it astonishing that the reviewer should misrepresent my book so thoroughly, and that he should give the readers of the Journal of the American Medical Association the impression that there have not been any thorough, large-scale studies of vitamin C and the common cold, when I had included a detailed discussion of several such studies in the book that he was reviewing.

A correct review would have included mention of the fact that several good controlled studies have been made of the effect of ascorbic acid in amounts of about 200 mg per day or 1,000 mg per day administered regularly to subjects, beginning before they had contracted colds, with other subjects receiving a placebo, and that it had been found that the ascorbic-acid subjects had fewer colds than the placebo subjects, that the severity of individual colds was less, and that these results were statistically significant.

An example of such a careful double-blind controlled trial carried out by reliable and experienced medical investigators is that of Drs. Cowan, Diehl, and Baker, reported in the JAMA for 1942. This investigation was described by Dr. Haven Emerson of New York as a "good example of a carefully controlled study." The authors reported that they had found a 15-percent smaller incidence of colds in the ascorbic-acid group than in the placebo group, and that this difference is statistically significant, the probability that it would occur through a statistical fluctuation in a uniform population affected equally by the ascorbic acid and the placebo being only 3 or 4 percent. They also reported that the average number of days of illness for the ascorbic-acid subjects was 31 percent less than for the placebo subjects. This difference is also statistically significant, at the 1-percent level. The amount of ascorbic acid given was about 200 mg per day.

Another very careful double-blind controlled study described in my book was reported by Dr. G. Ritzel, of the public school health service in Basel, Switzerland. In this investigation the subjects received 1,000 mg of

ascorbic acid per day, with the control subjects receiving a placebo. The detailed account of the work published by Dr. Ritzel in *Helvetica Medica Acta* for 1961 shows the care with which it was carried out. The incidence of colds for the ascorbic acid group was 45 percent less than that for the placebo group, with statistical significance at the 1-percent level. The total number of days of illness from upper respiratory infections was 61 percent less for the ascorbic-acid subjects than for the placebo subjects, and the incidence of individual symptoms was 85 percent less for the ascorbic acid subjects than for the placebo subjects. The author reports that statistical analysis by an independent team of statisticians showed that these differences had statistical significance at the 1-percent level.

The reviewer's statement that the efficacy of ascorbic acid in any dosage form has not been proved is false. Results with high statistical significance obtained by reliable medical investigators in carefully controlled studies, such as the two quoted above, have proved the efficacy of ascorbic acid, administered over a period of time to subjects exposed to cold viruses in the normal way, in decreasing the incidence and severity of the common cold, and these results have not been contradicted by statistically significant negative results in a single controlled test carried out under similar circumstances.

The review of my book misrepresents the facts completely.

Linus Pauling