Nutrition

Vitamin C: Cure for the Common Cold ?

By TERENCE W. ANDERSON

The idea that an increased intake of vitamin C may be helpful in fighting the common cold has been around since at least the 1930s, but it was not until 1970 that the publication of Linus Pauling's best seller, *Vita min C and the Common Cold,* turned the issue into a public controversy.[1] As a result of the interest generated by this controversy, a number of scientifically sound experimental studies have been carried out, and although there are still unanswered questions, it is now clear that vitamin C is, unfortunately, no panacea for colds or other respiratory infections.

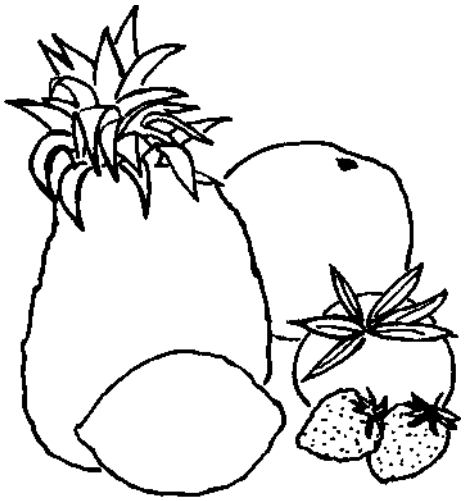
However, even if the promise of virtual eradication of the common cold (suggested as a possibility at one point in Pauling's book) has proved unrealistic, there remains enough intriguing evidence of some interaction between this vitamin and the infectious process to suggest that it is worth investigating further and that it may have a role, however limited, in reducing the burden of this relatively trivial but annoying affliction.

Prevention or Treatment?

In trying to unravel some of the confusion and conflicting evidence over the use of vitamin C in upper respiratory infections, it is helpful to recognize that its use has been suggested either to prevent the disease from occurring or to treat it once it has occurred. These are two quite different approaches and carry with them different practical implications.

If vitamin C is to be used prophylactically, one is faced not only with the problem of compliance (many people do not bother to take regular medication when they are free of symptoms), but also with an increased possibility of side effects, since these are more likely to occur with something taken regularly for months or years than with something used only occasionally and briefly as a treatment.

Two other issues of which individuals often lose sight in the rhetoric are the questions of effective dose and the basic nutritional status of the population. Thus if a daily intake of 1,000 mg of vitamin C is found to produce a beneficial effect, it is important to establish whether the same effect could be achieved



with a much smaller dose, since undesirable side effects are more likely to result from large doses than small ones. Further, whatever si/e Jose is taken, it is only likely to show an effect in a population that has room for improvement — in other words, well-nourished individuals are likely to be poor experimental subjects for demonstrating an effect of supplemental vitamin C.

So far, few of the experimental studies that have been carried out have shown much change in preventive effect from the regular intake of large doses of vitamin C, Even where there seems to have been some effect, it is probably max imal at intakes producing "saturation."

In normal healthy subjects this point is achieved at about 100-150 mg of vitamin C daily, but the amount needed may be increased considerably by acute or chronic illness and at times of environmental stress, for example, extreme cold and physical exertion. It is interesting that two of the few positive studies on regular vitamin C intake have involved people in these circumstances: one of students at a ski school in the Swiss mountains, [2] the other of Canadian Army troops in Arctic exercises.[3]

In relatively affluent urban subjects, it has been difficult to demonstrate much benefit from the consumption of gram quantities of vitamin C on either a prophylactic or a therapeutic basis. Recent studies have been reviewed by Chalmers[4] and Dykes.[5]

In our own studies in Toronto we found little effect from the purely prophylactic regimens, with no evidence of a gradient in effect across the dosage range of 250, 1,000, or 2,000 mg per day.[0] Indeed, the only impressive differences that we have seen in our experimental groups have been with a combination of prophylactic and therapeutic regimens.[6-8] Even in these groups there was little or *no* evidence of an effect on the frequency of colds, on their total duration, or on local (nasal) symptoms. Rather, the effect seemed to be restricted to the severity of the cold as measured by the amount of time spent off work or confined to the house.

The *therapeutic* value of vitamin C in large doses has received strong, anecdotal support. For example, Irwin Stone has claimed that over 95 percent of colds can be aborted by the prompt administration of approximately 1.5 g of vitamin C every half hour for three or four doses.[9] If some individuals have really experienced this sort of response, then one must consider the possibility that there is a subgroup of the population for whom vitamin C is effective; whereas, for the remainder, it is relatively (or completely) ineffective, since large-scale

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controlled trials have been unimpressive.[10,11]

One may attempt to reconcile the conflicting evidence by suggesting that increased intake of vitamin C on a regular basis or at the time of illness may exert a slight beneficial effect, more marked when the two regimens are combined. The size of the effect probably varies from person to person—many individuals may be relatively insensitive—and according to basic nutritional status, general state of health, and exposure to environmental or other stress.

Unknown Mechanism

Some investigators have concluded that although there may be a slight effect of vitamin C on the common cold, it is too small to be of any practical value and the subject is therefore not worth pursuing. But this view may be somewhat shortsighted, since it is possible that if we understood fully the mechanism involved in producing even a slight effect, we might be able to develop it further and produce effects that were quantitatively more worthwhile. As it is, very little is known about the mechanisms that might be involved in interactions among vitamin C, the common cold, and a number of other diseases.[12]

Some have suggested that there may be a type of antibiotic effect in which high concentrations of ascorbic acid have a specific antiviral or antibacterial effect. Human experiments have not lent much support to this belief, although if it were true, one would expect to see variation in effectiveness depending on the type of virus or bacterium causing the illness, and such variation might help to explain some of the conflicting results obtained in vitamin C trials.

Another possibility is that vitamin C has a type of antihistamine effect, and although there is some experimental evidence to support this view, in our studies we saw little evidence of a reduction in nasal irritation or stuffiness.

A third possibility—and the one that I find the most credible—is that any effect of vitamin C is via the host resistance to infection. This explanation would be consistent with animal experiments that have shown an improved resistance to stress, with our own experience of a reduction in general constitutional symptoms ("malaise"), and with the high concentration of vitamin C normally found in the adrenal cortex and its depletion at times of stress.

Toxicity

There have been virtually no documented instances of serious toxic reactions to vitamin C even when used in very large doses. This finding is not altogether surprising, since vitamin C is a substance essential for life and one to which we and our ancestors have been exposed for millions of years.

However, none of our ancestors could have been exposed to the quantities that are now easily available as a result of the production of the pure substance, and although it is a very simple molecule (similar to glucose), it is a strong reducing substance, an acid, and is biologically very potent. Therefore it is important to be cautious in its use.

There are a number of different ways, in theory at least, in which undesirable effects might occur:

- As an acid, large doses could precipitate acid stones in the urine, and as a reducing substance, vitamin C could interfere with some of the common diabetic urine tests.
- In susceptible individuals it could have unusual metabolic effects (a greatly increased output of oxalate is one that has been identified), which are extremely difficult to detect, since they may be too rare to be recognized even in large-scale studies.
- A potentially harmful reaction is the withdrawal effect on blood levels when cutting back after prolonged intake of large doses. Blood levels of the ascorbate ion reach a plateau ("saturation") at an intake of 100-150 mg per day, and the intake of even several thousand milligrams per day does not change this plateau level greatly. However, if after a few weeks of high intake the extra intake is stopped, blood levels can drop well below normal for several days.

Whether this last effect has any physiological significance is not known, but it is possible that if it occurred at the same time as a serious illness (for example, on admission to a hospital with a heart attack), it could handicap the body's attempts to deal with the extra stress.

Summary

Carefully controlled experimental studies have failed to support claims that the intake of large doses of vitamin C will prevent or cure the majority of colds. However, an increased regular intake or a large therapeutic dose at the time of illness may have a small beneficial effect, and this effect appears to be on severity rather than frequency or total duration of colds. The magnitude of the effect probably varies among individuals, in different environments, and possibly according to the type of infecting agent.

The use of very high doses of vitamin C may be harmful to some people, particularly if the intake is prolonged. However, for most people, a modest increase in the regular daily intake or brief episodes of high intake are unlikely to cause harm and may improve resistance to other types of illness, not only the common cold, a

References

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