

C supplements had 61% more URT infections than the runners who took vitamin C. Further, we are asked to believe that during a 2-wk period after a race in which they did not compete, 36 of 73 (49%) sedentary control subjects experienced URT infections with an average duration of about 5 d. Because the investigators did not infect their subjects with virus, it would appear to me that the subjects overreported their symptoms and that the validity of this study is questionable.

*Stanley N Gershoff*

School of Nutrition Tufts University Medford, MA 02155

### Reference

1. Peters EM, Goetzsche JM, Grobbelaar B, Noakes TD. Vitamin C supplementation reduced the incidence of postrace symptoms of upper-respiratory-tract infection in ultramarathon runners. *Am J Clin Nutr* 1993;57:170-4.

## Prophylactic vitamin C: misplaced zeal

Dear Sir:

For some time, I have been fascinated and bothered by the zeal of proponents of anti-oxidant nutrients, which I believe often biases their judgement. The recent paper by Peters et al (1) provides a good example. These investigators cited two epidemiological studies that indicated that ultramarathon runners experienced > 50% more upper-respiratory-tract (URT) infections than sedentary control subjects during the same time period, and decided to see whether vitamin C taken prophylactically might influence the incidence of postrace URT symptoms in runners competing in a 90-km race. Accordingly, in a double-blind study they provided 43 runners and 34 sedentary control subjects tablets with 600 mg vitamin C/d for 3 wk before the race while 41 runners and 39 sedentary control subjects received a placebo. During a 2-wk postrace period, telephone interviews were made with each subject who were asked to report symptoms including running nose, sneezing, sore throat, cough, and fever and the duration of these symptoms. The authors reported that among the runners who took the 600-mg vitamin C supplements (most of the runners appeared to be using vitamin mineral supplements before the study) there were 33% fewer symptoms of URT infections than in the runners given placebos. They also reported that the duration and severity of the symptoms in the vitamin C-supplemented nonrunning group was significantly less than in the nonrunning group receiving the placebo. Their conclusions will, no doubt, be hailed by the proponents of large doses of vitamin C as a protector against URT infections. A closer look at their data is disturbing. The nonrunners who took the vitamin

## Reply to SN Gershoff

Dear Sir:

Dr Gershoff implies that the findings of our studies are unreliable either because we are zealous proponents of antioxidant nutrients and therefore prone to bias, or because our method of study was flawed as shown by an unexpectedly high incidence of reported symptoms of upper-respiratory-tract (URT) infections in the control group.

It is not immediately apparent how Gershoff is aware of our supposed zeal for antioxidants because he provides no evidence to support his charge. Given the extent of his geographical displacement from South Africa, it is particularly surprising that he should be so certain of his opinion.

In fact, if we have an opinion of antioxidants, it is perhaps best described in the monograph of the senior author (1). The text, published in the United States, devotes an entire chapter to sports nutrition but does not mention antioxidants. In the more recent (South African) edition (2), the following has been added: "Yet there is growing consensus that an increased intake of the antioxidant vitamins E, C and A (beta-carotene), at levels higher than those normally recommended, may reduce the risk of both certain cancers and of heart disease (Riemersma et al 1991; Gey et al 1991). We have also found that an increased intake of vitamin C before and after the Comrades Marathon reduces the incidence of upper respiratory tract infections (Chapter 11). We can therefore expect some exciting developments in this field in the next few years."

We are confident that readers of *The American Journal of Clinical Nutrition* will be able to judge for themselves whether these views reasonably reflect current opinion in this field. Perhaps it is Gerhoff's zeal to dismiss out of hand any findings suggesting a possible therapeutic role for antioxidants that is the most disturbing characteristic revealed in his letter.

When he confines himself to strictly scientific issues, Gerhoff may be on firmer ground. The finding that a large proportion of

the sedentary control subjects reported symptoms of URT infections is certainly grounds for legitimate concern and could call into question the validity of the study methods. However, there is sufficient evidence to believe that the study methods are valid.

For example, using precisely the same technique, in 1983 we reported the first modern study (3) showing that the reported incidence of symptoms of URT infections was increased in athletes who had recently completed a 56-km ultramarathon. Since then, our own (4) and a number of other independently conducted studies (5, 6) have reported exactly the same finding; namely, that the incidence of infection is increased in persons who have recently participated in strenuous exercise, especially long-distance running. Indeed these studies have initiated an avalanche of studies into the effects of strenuous exercise on the immune system. That immune function is impaired by exercise, as predicted by our original finding (3), is now an accepted fact (7).

Thus, we would contend that our methods, indirect as they are, do measure changes in proneness to infection in runners. We do not claim that all subjects who reported these symptoms actually had URT infections, and this is clearly indicated in the title of the article and also repeatedly in the text. Thus, Gershoff has misrepresented our findings and his final comments lose their validity because the frequency with which persons normally report symptoms of URT infections, as opposed to suffering from documented infections, is not known.

Furthermore, the significant finding of the study was in the runners, not in the sedentary control group. For the main finding of the study to be spurious, either the runners receiving placebo must have overreported symptoms, or the runners taking the active substance must have underreported their symptoms. Apparently Gershoff is happy with these data and must therefore accept the principal finding of the study.

We would be the last to assume that, by itself, this study proves

beyond doubt, a beneficial effect of vitamin C supplementation in long-distance runners. We await with interest further studies that will either confirm or refute these data and are currently involved in two such studies undertaken by different workers at separate South African institutions.

Finally, Gershoff would perhaps be comforted to know that the company that sponsored this research has since been forced out of business, suggesting that this study did nothing to improve its financial viability.

*Edith M Peters Timothy D Noakes* Department of Physiology Sports Science Centre University of Cape Town Medical School Observatory 7925, South Africa

## References

1. Noakes TD. Lore of running. 3rd ed. Champaign, IL: Human Kinetics Publishers, 1991.
2. Noakes TD. Lore of running. 3rd ed. Cape Town, Republic of South Africa: Oxford University Press, 1992:522.
3. Peters EM, Bateman ED. Ultramarathon running and upper respiratory tract infection. *S Afr Med J* 1983;64:582-4.
4. Peters EM. Altitude fails to increase susceptibility of ultramarathon runners to post-race upper respiratory tract infections. *S Afr J Sports Med* 1992;5:4-8.
5. Nieman DC, Johansen LM, Lee JW. Infectious episodes in runners before and after the Los Angeles marathon. *J Sports Med Phys Fitness* 1990;30:316-28.
6. Heath GW, Ford ES, Craven TE, Macera CA, Jackson KL, Pate RR. Exercise and the incidence of upper respiratory tract infections. *Med Sci Sports Exerc* 1991;23:152-7.
7. Keast D, Cameron K, Morton AR. Exercise and the immune response. *Sports Med* 1988;5:248-67.