

support the contention of Sebastian Padayatty and Mark Levine that subclinical vitamin C deficiency is more common than is generally recognized.<sup>3</sup> An inverse association has been reported between plasma vitamin C concentration and glycosylated hemoglobin,<sup>4</sup> suggesting that measures to increase plasma vitamin C levels may help to reduce the prevalence of diabetes. A colleague and I reported that 1500 mg of vitamin C, when given orally, reduces plasma glucose levels in patients with type 2 diabetes.<sup>5</sup>

Other studies have suggested that vitamin C reduces blood pressure.<sup>6,7</sup> It may augment prostaglandin F and nitric oxide synthesis,<sup>8,9</sup> which could account for its beneficial actions in diabetes and hypertension. The interactions of vitamin C with eicosanoids, nitric oxide, platelets, leukocytes and endothelial cells, among other types of molecules and cells, may account for some of its hitherto-unexplained beneficial actions. As suggested by Padayatty and Levine, more studies should be conducted on vitamin C's actions in various tissues, including cancerous ones.<sup>3</sup> Until further studies are completed, however, caution should be exercised in advocating its use as an anti-cancer compound.

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#### [The authors respond:]

There is no doubt that vitamin C is a powerful antioxidant in vitro. It is less certain that vitamin C has antioxidant actions at physiologic concentrations in vivo.

Smokers and people with diabetes often have an unhealthy lifestyle, including a low intake of fruits and vegetables; this could partly account for the low plasma vitamin C concentrations in these groups. The low vitamin C levels could also be due to low bioavailability, increased utilization or even laboratory artifacts owing to oxidation of vitamin C during sample processing. Many apparently healthy people also have low plasma, and probably tissue, vitamin C concentrations.

In addition to its antioxidant effect, Vitamin C has been demonstrated to have many favourable actions in vitro and under experimental conditions in vivo. However, it is uncertain whether plasma concentrations of vitamin C higher than that necessary to prevent scurvy have any clinical benefit, except to serve as reservoir to forestall scurvy. Some studies have shown an association between increased vitamin C concentrations and a beneficial clinical outcome.<sup>1</sup> However, most of these studies do not distinguish whether the beneficial effect is due to vitamin C or something else, such as other components of fruits and vegetables or lifestyle factors. When pure vitamin C is administered, benefits are hard to demonstrate. For example, small short-term studies have shown a reduction in systolic blood pressure with vitamin C treatment<sup>2</sup> but the findings of larger studies are inconsistent.<sup>3,4</sup>

Despite intense public interest in vitamin C, widespread use of this vitamin and decades of experimental studies, its role in health and disease remains unclear. We believe that one path to clarity is to determine the effects of vitamin

C on targeted clinical outcomes in healthy people as well as in people with pro-oxidant states, such as smokers and patients with diabetes; the effects must be determined in relationship to the concentration of the vitamin. As in vitro studies and surrogate markers alone cannot predict a clinical outcome, practising physicians will expect us to show clear clinical benefit before they use vitamin C for prevention or treatment purposes.<sup>5</sup>

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## The abortion issue

Having read the well-written article by Laura Eggertson,<sup>1</sup> I feel that her thrust (and that of Planned Parenthood, the Canadian Abortion Rights Action League, Health Minister Allan Rock, etc.) is that it is a scandal and surprise that a “medically necessary” operation — abortion — is not universally accepted like other procedures.

You do not hear most of the old debating arguments about abortion any more, but the one that will not go away