Adverse effects of antioxidants

The letter on 'adverse effects of antioxidants'[1] referring to an earlier report[2] was interesting. However, the nature of adverse effects expected from consuming antioxidants (rich preparations), β-carotene or vitamin-E as antioxidants was not clearly illustrated. Rather, their therapeutic application based on antioxidant properties is being increasingly advocated for beneficial effects in various disease conditions. The importance of antioxidants, their mechanisms of action and the paradox related to β-carotene and vitamin-E are available in the literature[3]. Furthermore, vitamin-E, etc. have provided important insights into the design and development of novel therapeutics based on antioxidant mechanisms. Several views[4,5] advocating the development of antioxidant-based drugs have provided various positive points in rationalizing their development for the treatment of diseases of multifactorial origin.

These advances have led to the development of several drugs based primarily on antioxidant mechanism for the treatment of various diseases[6,7]. These developments have also paved ways in understanding therapeutic properties/mechanisms of several traditional medicinal plants/preparations based on antioxidant properties for multiple therapeutic effects[8,9] and opened new avenues for their mechanism-based therapeutic applications. These traditional Eastern medicines have been used for thousands of years. Western medicine, however, has not yet used them therapeutically, even though their safety record is exceptional[10].

As far as the long-term data on the adverse effects of antioxidant therapy is concerned, there is also no medicine without side effects. The therapeutic application of a drug is decided on the basis of its therapeutic risk-and-benefit ratio. The more it skews towards the latter side, the broader and better is the drug/composition's therapeutic range and safety. This holds true for the antioxidant-based drugs also, as they are being reported to possess broad spectrum multiple therapeutic properties[7–10]. The concerns therefore, of adverse effects of antioxidants[1] do not appear sound. Moreover, the development of a drug relates to the benefits of suffering humankind. The search and development of effective and multiple-mechanism based therapeutics from traditional medicinal practices are the requirements of the day. Nayeemunnisa and Kumuda Rani[2] have made positive efforts in delineating the beneficial therapeutic effects of traditional medicine, *Cichorium intybus*. Such efforts should be encouraged rather than propagating the adverse effects without substantial reasons.

1. Chattopadhyay, M. K., *Curr. Sci.*, 2003, **85**, 121.
2. Nayeemunnisa and Kumuda Rani, M., *Curr. Sci.*, 2003, **84**, 941–943.
3. Tiwari, A. K., *Curr. Sci.*, 2001, **81**, 1179–1187.
4. Noguchi, N. and Niki, E., *Free Radical Biol. Med.*, 2000, **28**, 1538–1546.
5. Prasad, K. N., Cole, W. C., Hovland, A. R., Prasad, K. C., Nahreini, B. K., Edward-Prasad, J. and Andreatta, C. P., *Curr. Opin. Neurol.*, 1999, **12**, 761–770.
6. Sorbera, L. A., Leeson, P. A. and del Frenso, M., *Drugs of the Future*, 2002, **27**, 240–247.
7. Wasserman, M. A., Sundell, C. L., Kunsch, C., Edwards, D., Meng, C. Q. and Medford, R. M., *Am. J. Cardiol.*, 2003, **91** (suppl), 730–741.
8. Tiwari, A. K., *J. Med. Aromatic Plant Sci.*, 1999, **21**, 730–741.
9. Inoue, M., *Drug News Perspect.*, 2000, **13**, 407–412.
10. Middleton, C. Jr., Kandaswami, C. and Theoharides, T. C., *Pharmacol. Rev.*, 2000, **52**, 673–751.

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Conceived conclusions in favour of GM cotton? – A riposte to a paper in *Science*

Conflicting scientific, public and farmer opinion on the benefits of GM crops is well known and widely documented. The science behind GM crops is not under dispute, but their adaptation to the target site, consequent changes in the bio-environment, promised benefits and their sustainability certainly are.

A recent article that appeared in *Science* by Qaim and Zilberman (Q&Z)[1] has resuscitated the controversy by drawing questionable results and incongruous inferences from an analysis of yield trial data. 395 trials were laid during 2001 on farmers' field across seven Indian states. (names not given) by the Mahyco–Monsanto group to test their *Bt*-cotton hybrid. A non-*Bt* counterpart and a popular check (details not given) were also raised in contiguous plots of 646 m^2 each. Evaluating a sample of 157 trials from three states, Q&Z observed a reduction in pesticide use by 70% in *Bt* cotton and yield increase by 80 and 87% over non-*Bt* cotton and popular check. Interpreting that 'a general germplasm effect (not defined) was more or less negligible' and 'the yield gains are largely due to the *Bt* gene itself', Q&Z concluded that 'it will be important' for India 'to release additional *Bt* cotton hybrids so that the technology yield gains for farmers are not curbed by a general germplasm disadvantage'.

Unconvinced by the conclusions, scanty details and a number of bugs in the table presenting yield and insecticide data in the paper, we contacted the senior author who kindly answered all our queries. We present below our critical review in the new light of the author's response (mostly in italics).

The data are not only from actual field trials but also from those of a survey by the authors since *they did not entirely*