CaMV DNA is not a novel cancer risk

Dr Stanley Ewen recently warned of cancer risk from GM crops in a statement delivered to the Health and Community Care Committee of the Scottish Parliament. In particular, he was concerned that a cauliflower virus used in some GM foods (actually, only the viral gene promoter is present) could increase the risk of stomach and colon cancers. The story was reported in a prominent Scottish newspaper (Sunday Herald) and has doubtless further alarmed an already fearful public about the risks of GM foods (http://www.sundayherald.com/29821).

However, there is nothing new about this story and Dr Ewan's claims can readily be laid to rest. The virus in question is the cauliflower mosaic virus (CaMV) and, as almost any vegetable gardener will tell you, it is one of the most common diseases of all our brassica crops. These crops include such important staples as cabbage, Brussels sprouts, cauliflower, broccoli, turnip and Swede, as well as major seed crops like mustard and oilseed rape.

CaMV is a virus that occurs worldwide, principally infects brassicas and other members of the *Cruciferae*, but otherwise has a restricted host range. In the UK, for example, CaMV incidence in oilseed rape varies from year to year. In 1991 and 1993, between 14% and 25% of plants sampled from test fields were infected with CaMV (1). Also, 60% of naturally occurring wild cabbage plants (*B. oleracea*) in Dorset (UK), were found to be infected with CaMV (2). In short, CaMV has a variable but significant incidence in many locations over a wide geographical region.

Dr Ewan characterises CaMV as a potential "growth factor in the stomach or colon, encouraging the growth of polyps". But the relatively frequent incidence of CaMV in so many staple food crops means that humans must have been inadvertently ingesting the virus for many millennia. Given this long history of exposure to such an apparently worrisome virus, it is curious that there have as yet been no reports on the adverse effects of brassica vegetables on the human gut (or anywhere else for that matter).

Quite to the contrary in fact, as has been shown in the evidence linking brassica isothiocyanates with anti-cancer activity, both in cultured human cells and in animal model systems (3). Researchers at the Harvard School of Public Health recently confirmed the added cancer protection that Brassica vegetables provide. They followed over 47,000 men in the Health Professionals Follow-up Study and complied food intake data over the course of eight years. They found that eating Brassica vegetables was linked to a 51% reduction in the risk of bladder cancer. In contrast, no association was found with eating other vegetables or fruits (4).

Furthermore, Dr Richard Mithen and co-workers, have developed new varieties of vegetables, such as broccoli, that are particularly enriched in these cancer-protecting compounds (5,6). Several companies have licensed the use of such brassica vegetables for marketing as "healthy eating" options in supermarkets. Interestingly, these modern scientific studies merely confirm centuries-old folk traditions about the efficacy of brassica vegetables in protecting people against the risk of cancer (http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_napus.html).

It is true that the CaMV promoter used in transgenic plants is randomly integrated into the plant genome whereas, in an intact virus, the CaMV DNA is protected by a protein coat. This point has been used by Dr. Mae-wan Ho to stress that there is "*a great deal of difference between the CaMV eaten in vegetables every day, and the promoter CaMV. Viruses, she said, are protected in the environment by a protein coat that also confers species specificity. The CaMV cannot enter mammalian cells because its protein coat is specific to plant cells. But the CaMV promoter used in GMOs comes in the form of naked viral DNA and naked DNA of any sort is highly infectious*" (http://www.twnside.org.sg/title/gmo-cn.htm).

But Dr Ho is not correct in assuming that all of the CaMV ingested in brassica vegetables would be in the form of intact virus particles shielded by a protein coat. Many of the viruses would have penetrated into the nuclei of infected plant cells, where their DNA replicates as naked plasmids. This replicating form of the virus would be present in many brassica vegetables. The viral DNA would be unshielded by its protein coat and presumably therefore theoretically available for recombination with other DNA, whether from different

viruses or from bacterial or human cells in the gut – just like the recombinant CaMV that Dr Ho warns us about above.

Does this make you think twice about eating uncooked brassicas (e.g. watercress)? I certainly hope not, especially given the evidence that, in addition to its well-known generalised anti-cancer role (5), the consumption of just 170g (6oz) of watercress per day protected smokers from the major lung carcinogen in tobacco smoke (7).

In conclusion, Dr Ewan's assertions would appear to be based on speculation that does not take into account the prevalence of viruses like CaMV in our normal diet. Much of our food contains viral DNA, either intact or fragmented, and the kinds of theoretical risks from GM food containing the CaMV gene promoter would therefore apply to many long-standing and efficacious dietary components.

References

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