

FSANZ Submission

Application A1069 – Irradiation of Tomatoes & Capsicums

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I oppose irradiation of Tomatoes and Capsicums.
Below are my reasons, followed by references in italics.

Food allergies and low dose irradiation

A very recent study found that foods irradiated with low dose radiation can cause severe allergic inflammatory responses.

Food Chem Toxicol. 2012 Sep 19;51C:46-52.

Low-dose gamma irradiation of food protein increases its allergenicity in a chronic oral challenge.

Vaz AF, Souza MP, Medeiros PL, Melo AM, Silva-Lucca RA, Santana LA, Oliva ML, Perez KR, Cuccovia IM, Correia MT.

Unforeseen disease development

A 2009 study showed that cats which were fed an irradiated diet during gestation developed neurological disease.

PNAS July 21, 2009 vol. 106 no. 29 12208

Extensive remyelination of the CNS leads to functional recovery

D. Duncan, A. Brower, Y. Kondo, J. F. Curlee, Jr. and R. D. Schultz

As a result of eating irradiated pet food 87 cats were paralysed in Australia. Obviously a human would not be eating a completely irradiated diet, but the unforeseen dangers of irradiated food are clearly demonstrated by this incident.

Aust Vet J. 2009 Sep;87(9):349-51.

Ataxia and paralysis in cats in Australia associated with exposure to an imported gamma-irradiated commercial dry pet food.

Child G, Foster DJ, Fougere BJ, Milan JM, Rozmanec M.

Undesirable compounds can be formed as a result of irradiating produce

Furan, a possible carcinogen, is found at low levels naturally in some foods. The addition of further amounts to food via the irradiation process is unacceptable.

This study showed that furan was produced at a level of low parts per billion from sugar at levels found commonly in fruits.

Agric Food Chem. 2005 Oct 5;53(20):7826-31.

Formation of furan from carbohydrates and ascorbic acid following exposure to ionizing radiation and thermal processing.

Fan X.

Degradation of carbohydrates

Irradiation leads to the degradation of starch, cellulose and pectin occurring mainly through the cleavage of the glycosidic bonds, leading to the formation of sugars such as glucose, maltose, erythrose, ribose and mannose. Further degradation results in radiolytic products including formic acid, acetaldehyde, methanol, ethanol, acetone and methyl formate.

Food Irradiation Principles and Applications edited by RA Molins 2001

Danger of genotoxicity

Genotoxic substances can damage DNA and cause mutations and cancer.

In mammalian cells, DNA damage demonstrates the genotoxicity of 2 ACB's.

Whilst 2 ACB's form in proportion to the amount of fat in the food, and tomatoes and capsicums would contain very low amounts, the widespread adoption of irradiation could lead to other produce with higher fat content being treated eg: avocados, nuts etc

Food Chem Toxicol. 2007 Dec;45(12):2581-91.

Toxicological potential of 2-alkylcyclobutanones--specific radiolytic products in irradiated fat-containing food--in bacteria and human cell lines.

Hartwig A, Pelzer A, Burnouf D, Titéca H, Delincée H, Briviba K, Soika C, Hodapp C, Raul F, Miesch M, Werner D, Horvatovich P, Marchioni E.

Radiolytic products found in irradiated foods may cause cancer.

Irradiating food produces radiolytic compounds eg 2 alkylcyclobutanones or 2 ACB's.

In experimental conditions [in vitro] 2 – ACB's were shown to have cytotoxic and genotoxic properties, and also have a promotor effect for development of tumors in rat colons.

Toxicological study on 2-alkylcyclobutanones-results of a collaborative study

Marchioni, E.; Raul, F.; Burnouf, D.; Miesch, M.; Delincee, H.; Hartwig, A.; Werner, D.

Radiation Physics and Chemistry

Volume 71, Issues 1–2, September–October 2004, Pages 147–150

In this study 2-ACB's were also found to promote colon tumours in rats.

Food-Borne Radiolytic Compounds (2-Alkylcyclobutanones) May Promote Experimental Colon Carcinogenesis

Francis Raul, Francine Gossé, Henry Delincé, Andrea Hartwig, Eric Marchioni, Michel Miesch, Dalal Werner, Dominique Burnouf

Endangerment of our horticultural industry

Radiation of crops may well increase imports of cheap produce from countries where workers are paid a subsistence wage and therefore would endanger our horticultural industry as well as encouraging the continuing exploitation of the poor in Third World countries.

Fumigation of produce – irradiation not the only answer

Irradiation is seen as the answer to fumigation problems. However it makes more sense to not import from countries which have pest problems.

For example - Australian fruit and vegetable crops that host fruit fly and other pests should not be imported to NZ, just as Australia doesn't allow NZ potatoes because of risk of Pysillid contamination.

There are a range of alternative Phyto-sanitary techniques, such as heat or cold treatments, controlled atmospheres, and ozone treatments that can be used if imports are still seen as critical.

Food labelling

Irradiated produce currently has a nebulous labelling requirement. The Radura symbol should be clearly displayed. Unpackaged fruit and vegetables should be individually stickered to advise consumers of irradiation treatment. If Produce marketers are able to put labels on fruit saying such inane things as 'Yummy', then irradiation stickers should not be a problem. This should be implemented immediately as epidemiological studies regarding irradiated food safety cannot be carried out if the consumer is unable to identify the type of food they are consuming. Clear labelling of treated produce would also allow consumer choice, leading to an accurate representation of public acceptance of the technology.

Conclusion

This application would appear to be the thin end of the wedge. The approval of A1069 could pave the way for the approval of irradiation for other food products.

Food irradiation appears to have few benefits for the consumer. Whilst the food industry is concerned with Phytosanitary requirements and a longer shelf life for products, consumers would seem to desire fresh, nutrient rich produce preferably without adverse health effects. One would hope FSANZ gives consideration to both party's needs.

Toni Reid

7/11/2012