Published on *American Council on Science and Health* (https://www.acsh.org)

Irradiated Food for Thought

By ACSH Staff — July 26, 2004

Irradiated foods dangerous? Here we go again. And this time, it isn't the media sounding the health (scare) alarm but members of the science community. Which just goes to show, having a medical degree does not guarantee a degree of rationality.

In a July 2004 letter to the *New England Journal of Medicine*, Dr.s McNally and Donohoe criticize two reports on the benefits of food irradiation, one by an international leader in the field of infectious disease, the other by a retired USDA microbiologist.[1,2,3] McNally and Donohoe's correspondence questions the safety and efficacy of food irradiation, despite the wealth of evidence against such concerns.

Why We Fight Pathogens

An estimated 76 million cases of foodborne diseases, resulting in approximately 5,000 deaths and 325,000 hospitalizations, occur annually in the United States. Many of the dead are children, the elderly, or others who have weak or compromised immune systems and cannot fight off infection. The irradiation of food has the potential to decrease the incidence of these cases dramatically by destroying the responsible pathogens, such as E. coli, salmonella, and listeria. In fact, the CDC estimates that if this technology were used for 50% of all U.S.-produced meat and poultry, there would be 900,000 fewer disease cases and 352 fewer deaths due to foodborne illnesses per year.

A recent CDC report indicated that while the incidence of some foodborne illnesses has declined, that of others, such those caused by listeria, vibrio, and shigella has not. Is this not a clear indicator of a need for better food safety measures?

Unfortunately, food irradiation technology is widely underused; only 0.002 percent of fruits, vegetables, and meats are irradiated in the U.S. This is due primarily to misconceptions about what irradiation is.

The Main Fears

Food *irradiation* involves the use of high-energy radiation in the form of *gamma rays*, *x-rays*, or *electron beams*, terms that continue to conjure Outer Limits-like images of eerily glowing hamburgers and radioactive potatoes with thirty eyes. This association, however, is best left to writers of science fiction. The radiation sources approved by the FDA for food treatment, including cobalt-60, have specific energy levels far lower than that which could cause food elements to become radioactive. In fact, irradiated food is no more radioactive than your teeth after a dental x-ray, your luggage after a trip through an airport scanner, or even the natural background radiation present in everything in our surrounding environment.

In a similar vein, the fear that food irradiation technology will produce nuclear waste or present a

health hazard to workers in food-processing facilities is also made moot by the fact that the same technology has been used safely for decades now to sterilize therapeutic products like surgical gloves, baby-bottle nipples, and personal-hygiene products, as well as cosmetics, flooring materials, and more. None of these procedures, many of which involve far higher levels of radiation than that applied to food, have presented any danger to consumers, workers, or the environment.

There has been much concern that 2-alkylcyclobutanones (2-ACBs), byproducts unique to the food irradiation process, are carcinogenic in animals and may also be harmful to humans. This fear, however, originated from studies involving doses of 2ACBs a thousand times higher than the level found in irradiated foods. Even the authors of these studies cautioned against the use of their data to indict irradiated foods. In addition, several tests in which irradiated foods were fed to both humans and animals have led most scientists to concur that these compounds are not hazardous at the levels found in food.

Another argument brought against food irradiation is that it destroys the nutritional quality of foods. This argument is founded on the notion that the addition of any energy, even heat, to food can break down nutritional molecules to some degree. But the results of an FDA review, as well as an independent Argentinean study, have shown that irradiation is not a crucial risk to any dietary nutrient, even those ones particularly sensitive to irradiation, such as thiamine. It should also be remembered that irradiated foods are consumed as part of a mixed diet and as such will have less impact on the total intake of specific nutrients. The American Dietetic Association supports this conclusion.

Lastly, there is the concern that irradiation will destroy the sensory characteristics of food, such as aroma and taste. While this is a fair assumption given the chemical changes induced by the addition of energy, it must be kept in mind that different foods will require different methods and degrees of irradiation, like any other form of food processing. The optimum dose must be ascertained via trial and error. Whereas too high a dose may produce sensorial effects, too low a dose will not achieve the desired level of pathogen protection.

New technologies often take time to be accepted by the mainstream, as was once the case with immunizations and the pasteurization of dairy foods. Activist groups might exploit the inaccurate understanding consumers have of food irradiation, exacerbated in part by the technology's unfortunate name. But it is irresponsible for members of the medical community, to whom consumers look for advice, to perpetuate such distorted statements.

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References:
1McCally M. and Donohoe, M. Letter to the Editor. NEJM. July 22, 2004;402.
2Osterholm, M. and Norgan, A. The Role of Irradiation in Food Safety. NEJM. April 29, 2004;1898-1901.
3Thayer, D. Irradiation of Food-Helping to Ensure Food Safety. NEJM. April 29, 2004;1811-1812.

For more information on the safety and efficacy of food irradiation, please see:

Irradiated foods:
http://www.acsh.org/publications/pubID.198/pub_detail.asp [2]
