



Health Physics Society
Specialists in Radiation Safety

Food Irradiation

What is food irradiation?

Food irradiation involves briefly exposing foods to a radiant energy source such as gamma rays, x rays, or electron beams within a shielded facility. Food irradiation is a process applied to certain foods to obtain the following results:

- Extended food shelf life and delayed spoilage.
- Disinfestation without the use of chemical insecticides.
- Prevention of post-harvest losses by inhibiting sprouting in root, tuber, and bulb crops.
- Shortened quarantine periods, allowing importation and distribution of high-value and quality products.
- Significant reduction in levels of disease-causing microbes and associated foodborne illnesses.



Photo courtesy of Texas A&M University System National Center for Electron Beam Research

Retail food packages on conveyor belt after e-beam irradiation

Is irradiated food radioactive?

No, irradiated food never contacts any radiation source, so there is no opportunity for it to become radioactively contaminated. The radioactive sources that are used are totally contained in dense metal casings, such as concentric layered stainless steel cylinders. This allows the radiation to be emitted without the physical release of any material, similar to light leaving a bulb through glass. When high-energy electrons or x rays are used, all radiation is generated electrically and there is no radiation or radioactivity present when the process is “off.” When

the radiation is “on” (just as when the lightbulb is on) food passes through the radiation field (the area illuminated by the bulb) and is treated or irradiated. When the radiation beam is turned off (just as when the lightbulb is off) the irradiation stops. None of these types or energies of radiation can cause food to become radioactive,

just as dental x rays do not cause patients to become radioactive.

Does irradiation harm food or make it harmful to eat?

No. All aspects of food irradiation have been extensively studied. Comparison of the nutritional value of irradiated food with nonirradiated food reveals little difference. Processing food by traditional means, such as cooking or canning,

causes some chemical changes to occur within food, and irradiation causes similar changes. Food that is irradiated at prescribed doses may lose a little nutritional value, such as vitamin reduction, but the loss is not considered significant and is inconsequential when viewed in terms of an individual’s entire diet. The food irradiation process is tailored to give the proper amount of radiation to each kind of food in order to obtain the desired effect while still maintaining significant nutritional value. There is no valid scientific evidence or plausible expectation that consuming irradiated food would be harmful to humans. The very real benefit of this treatment technology in increasing the availability of healthy and nutritious food supplies far outweighs any purported indirect risks.

Should irradiated foods be prepared differently from nonirradiated foods?

No, irradiated foods should still be handled, prepared, and stored the same as any foods. Food irradiation offers an added level of illness prevention and preservation, but it is not intended to be a replacement for sound sanitation practices. The amount of potentially dangerous microbes is greatly reduced by this technology, but food can still be infected or may be subsequently contaminated without the continued use of proper processing, storage, and preparation techniques.

How are food irradiators regulated?

Food irradiators utilizing radiation sources or high-energy x rays and electron beams are strictly regulated by international, federal, and/or state licensing agencies that provide health and safety oversight for employees, the general public, and the environment.

Products currently approved for irradiation by the U.S. Food and Drug Admini-

stration are listed below (with the purpose for irradiation in parentheses):

- Wheat and wheat flour (disinfestation of insects).
- White potatoes (inhibit sprouting and extend shelf life).
- Spices, herbs, and dry vegetable seasonings (disinfestation of insects and decontamination).
- Pork carcasses or fresh, nonheat-processed cuts (control of *Trichinella spiralis* and/or microorganisms).
- Fruit (delay of maturation and disinfestation of insects).
- Fresh vegetables (disinfestation of insects).
- Fresh or frozen poultry (control of microorganisms, particularly *Salmonella*).
- Fresh, frozen, or chilled red meat (control of *Escherichia coli* and *Salmonella*).
- Animal and pet food (control of *Salmonella*).
- Fresh-cut produce—lettuce and spinach (removal of microbial pathogens).



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Radura Symbol

The 1958 Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act defined ionizing radiation as a food additive, rather than a process, even though nothing but energy is added. This Act mandates the Food and Drug Administration (FDA) to regulate food irradiation. The “radura” symbol shown here is internationally recognized as an indication of irradiated food and is displayed on foods offered for sale to the public. The label stating “Treated with Radiation” or “Treated by Irradiation” also appears on the product. Approximately 40 countries, including the United States of America, sell irradiated food.

Key organizations that have published positions on food irradiation technology

The Food and Agricultural Organization of the United Nations, the International Atomic Energy Agency, and the World Health Organization. High-dose irradiation: Wholesomeness of food irradiated with doses above 10 KGy: Report of a joint FAO/IAEA/WHO study group. Geneva, Switzerland, 15-20 September 1997. Technical Report Series, No 890, ISBN: 92 4 120890 2. Available at: http://www.who.int/foodsafety/publications/fs_management/en/irrad.pdf. Accessed 11 June 2010.

American Medical Association. Position H-150.961 irradiation of food. Retrieved via AMA PolicyFinder I-09. Available at: <https://ssl3.ama-assn.org/apps/ecom/PolicyFinderForm.pl?site=www.ama-assn.org&uri=/ama1/pub/upload/mm/PolicyFinder/policyfiles/HnE/H-150.961.HTM>. Accessed 11 June 2010.

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Centers for Disease Control and Prevention. Irradiation of food. Available at: http://www.cdc.gov/nczved/divisions/dfbmd/diseases/irradiation_food. Accessed 11 June 2010.

Resources for more information

Tauxe RV. Food safety and irradiation: Protecting the public from foodborne infections. Emerging Infectious Diseases 7:516-521; 2001. Available at: http://www.cdc.gov/ncidod/eid/vol7no3_supp/pdf/tauxe.pdf. Accessed 11 June 2010.

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U.S. Food and Drug Administration. Irradiated food & packaging. Available at: <http://www.fda.gov/Food/FoodIngredientsPackaging/IrradiatedFoodPackaging/default.htm>. Accessed 11 June 2010.

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Code of Federal Regulations. Title 21—Food and drugs, Chapter 1, Part 179. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_09/21cfr179_09.html. Accessed 11 June 2010.

Food Irradiation Processing Alliance. Food irradiation: Questions and answers. Available at: <http://www.fipa.us/q%26a.pdf>. Accessed 11 June 2010.

The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Formed in 1956, the Society has approximately 5,500 scientists, physicians, engineers, lawyers, and other professionals. Activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.