

Nuclear Lunch: The Dangers and Unknowns of Food Irradiation

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The recent push for food irradiation fails to acknowledge the technology's inherent dangers, its intricate connections to the nuclear industry, and the FDA's failure to prove safety.

Beginning in 1986, the FDA has given the green light to expose nearly our entire food supply to nuclear irradiation. Since then, staunch citizen opposition has kept the technology out of use. But the recent hamburger recall has led both the food and nuclear industries to push hard for beef irradiation's approval. Its use in the beef industry would open the door to irradiation as the 'solution' to contamination crises in all food groups, from poultry to fruits and vegetables.

With beef irradiation on the fast-track through the FDA process, citizen opposition, not government regulation, remains the critical component in keeping irradiated food off store shelves. And from the hazards inherent in the technology to the FDA's own admission that the safety studies are flawed, the risks involved with food irradiation still far outweigh the presumed 'benefits.'

Irradiation Basics

Food is irradiated using radioactive gamma sources, usually cobalt 60 or cesium 137, or high energy electron beams. The gamma rays break up the molecular structure of the food, forming positively and negatively charged particles called free radicals. The free radicals react with the food to create new chemical substances called 'radiolytic products.' Those unique to the irradiation process are known as 'unique radiolytic products' (URPs).

Some radiolytic products, such as formaldehyde, benzene, formic acid, and quinones are harmful to human health. Benzene, for example, is a known carcinogen.

In one experiment, seven times more benzene was found in cooked, irradiated beef than in cooked, non-irradiated beef. Some URPs are completely new chemicals that have not even been identified, let alone tested for toxicity.

In addition, irradiation destroys essential vitamins and minerals, including vitamin A, thiamine, B2, B3, B6, B12, folic acid, C, E, and K; amino acid and essential polyunsaturated fatty acid content may also be affected. A 20 to 80 percent loss of any of these is not uncommon.

Safety Studies Flawed

The FDA reviewed 441 toxicity studies to determine the safety of irradiated foods. Dr. Marcia van Gemert, the team leader in charge of new food additives at the FDA and the chairperson of the committee in charge of investigating the studies, testified that all 441 studies were flawed.

The government considers irradiation a food additive. In testing food additives for toxicity, laboratory animals are fed high levels (in comparison to a human diet) of potential toxins. The results must then be applied to humans with theoretical models. It is questionable whether the studies the FDA used to approve food irradiation followed this process. In fact, the FDA claimed only five of the 441 were 'properly conducted, full adequate by 1980 toxicological standards, and able to stand alone in support of safety.' With the shaky assurance of just five studies, the FDA approved irradiation for the public food supply.

To make matters worse, the Department of Preventative Medicine and Community Health of the New Jersey Medical School found two of the studies were methodologically flawed. In a third study, animals eating a diet of irradiated food experience weight loss and miscarriage, almost certainly due to irradiation-induced vitamin E dietary deficiency. The remaining two studies investigated the effects of diets of foods irradiated at doses below the FDA-approved general level of 100,000 rads. Thus, they cannot be used to justify food irradiation at the levels approved by the FDA.

Other studies indicate serious health problems associated with eating irradiated food. A compilation of 12 studies carried out by Raltech Scientific Services, Inc. under contract with the U.S. government examined the effect of feeding irradiated chicken to several different animal species. The studies indicated the possibility of chromosome damage, immunotoxicity, greater incidence of kidney disease, cardiac thrombus, and fibroplasia. In reviewing Raltech's findings in 1984, USDA researcher Donald Thayer asserted, 'A collective assessment of

study results argues against a definitive conclusion that the gamma-irradiated test material was free of toxic properties.'

Studies of rats fed irradiated food also indicate possible kidney and testicular tumors. One landmark study in India found four out of five children fed irradiated wheat developed polyploidy, a chromosomal abnormality that is a good indication of future cancer development.

Irradiation proponents often claim that decades of research demonstrate the safety of food irradiation, but the studies they use to prove it are questionable. For instance, their 'proof' includes studies completed by Industrial Bio-Test (IBT), a firm convicted in 1983 of conducting fraudulent research for government and industry. As a result of IBT's violations, the government lost about \$4 million and six years of animal feeding study data on food irradiation. Some of this discredited work is still used as part of the 'scientific' basis for assurances of the safety of food irradiation.

Accidents happen

Workers in irradiation plants risk exposure to large doses of radiation due to equipment failure, leaks, and the production, transportation, storage, installation, and replacement of radiation sources. The Nuclear Regulatory Commission (NRC) has recorded 54 accidents at 132 irradiation facilities worldwide since 1974. But this number is probably low since the NRC has no information about irradiation facilities in approximately 30 'agreement states' which have the authority to monitor facilities on their own.

New Jersey is home to the highest concentration of irradiation facilities, and virtually every New Jersey plant has a record of environmental contamination, worker overexposure, or regulatory failures. Accidents can be nearly fatal to workers and extremely dangerous to the surrounding communities. For instance:

In 1991, a worker at a Maryland facility suffered critical injuries when exposed to ionizing radiation from an electron-beam accelerator. The victim developed sores and blisters on his feet, face, and scalp, and lost fingers on both hands.

In 1988, Radiation Sterilizers, Inc. (RSI) in Decatur, GA, reported a leak of cesium 137 capsules into the water storage pool, endangering workers and contaminating the facility. Workers then carried the radioactivity into their homes and cars. Cleanup costs exceeded \$30

million, and taxpayers footed the bill.

In 1986, the NRC revoked the license of a Radiation Technology, Inc. (RTI) facility in New Jersey for 32 worker-safety violations, including throwing radioactive garbage out with the trash and bypassing a key safety device. As a result of this negligence, one worker received a near lethal dose of radiation.

In 1982, an accident at International Nutronics in Dover, NJ, contaminated the plant and forced its closure. Radiation baths were used to purify gems, chemicals, food and medical supplies.

In 1974, an Isomedix facility in new Jersey flushed radioactive water down toilets and contaminated pipes leading to sewers. In the same year, a worker received a dose of radiation considered lethal for 70 percent of the population. Prompt hospital treatment saved his life.

Not a Silver Bullet

Irradiation poses serious risks, and it still does not ensure safe meat. Although it kills most bacteria, it does not destroy the toxins created in the early stages of contamination. And it also kills beneficial bacteria which produce odors indicating spoilage and naturally control the growth of harmful bacteria.

Irradiation also stimulates aflatoxin production. Aflatoxin occurs naturally in humid areas and tropical countries in fungus spores and on grains and vegetables. The World Health Organization (WHO) considers aflatoxin to be a significant public health risk and a major contributor to liver cancer in the South.

In addition, irradiation will likely have a mutagenic effect on bacteria and viruses that survive exposure. Mutated survivors could be resistant to antibiotics and could evolve into more virulent strains. Mutated bacteria could also become radiation-resistant, rendering the radiation process ineffective for food exposed to radiation-resistant strains.

Radiation-resistant strains of salmonella have already been developed under laboratory conditions, and scientists at Louisiana State University in Baton Rouge have found that one bacteria occurring in spoiled meat and animal feces can survive a radiation dose five times what the FDA will eventually approve for beef. Scientists exposed the bacteria, called D.radiodurans, to between 10 and 15 kilograys (kGy) of radiation for several hours -- enough radiation to kill a person

several thousand times over. The bacteria, which scientists speculate evolved to survive extreme conditions of dehydration, survived the radiation exposure.

The Nuclear Connection

To irradiate beef and poultry in the U.S. on a mass scale, hundreds of irradiation facilities would need to be built. Currently, the radiation source for most irradiators is cobalt 60, supplied by the Canadian company Nordion International, Inc. But the only isotope available in sufficient quantities for large-scale irradiation is cesium 137, which is also one of the deadliest. With a half-life of 30 years, cesium 137 remains dangerous for nearly 600 years.

The U.S. Department of Energy (DOE) initially encouraged food irradiation as part of its Byproduct Utilization Program (BUP) created in the 1970s to promote the commercial use of nuclear byproducts. The DOE claimed nuclear byproducts 'have a wide range of applications in food technology, agriculture, energy, public health, medicine, and industrial technology,' and wanted to 'ensure full realization of the benefits of the peaceful atom.'

At the same time, it would transfer the burden of nuclear waste from weapons production to consumers -- a fact the DOE admitted to the House Armed Services Committee in 1983: 'The utilization of these radioactive materials simply reduces our waste handling problem... we get some of these very hot elements like cesium and strontium out of the waste.'

Not only would this take care of DOE's waste problem, it would develop the technology to reprocess spent nuclear reactor fuel in order to recover cesium 137. the reprocessing would also enable the DOE to recover plutonium, the main ingredient for nuclear weapons.

After the 1988 irradiator accident in Decatur, Georgia, the DOE stopped actively promoting food irradiation and the use of cesium 137. But the store of cesium 137 is ready and waiting.

Irradiation Today

With the FDA's imminent approval of beef irradiation, the irradiation

industry is poised to use it as a springboard for flooding the market with a new wave of food irradiation promotion. But to be successful, irradiation proponents must convince retailers that consumers want the technology. The irradiation industry sees education or 'consumer training' as the key to citizen acceptance.

In response, scientists at major land-grant universities, with the full support of the USDA, are developing 'educational' materials. Iowa State University (ISU), home of one of two publicly held food irradiation facilities in the U.S., developed a pro-irradiation educational video with a \$39,000 grant from the USDA Extension Service. The USDA gave grants to projects designed to influence public acceptance of food technologies, specifically food irradiation.

But citizens don't want irradiated foods. Surveys conducted in 1990 and 1994 by HealthFocus, a marketing consulting firm specializing in consumer health trends, found that over 80 percent of consumers were concerned about food irradiation. A study at ISU found when consumers are given solid arguments both for and against irradiation, acceptance of the technology is substantially lower than if they were only given the pro-irradiation side of the story. An August 1997 CBS News poll found nationwide 73 percent of people oppose it, and 77 percent say they wouldn't eat irradiated food.

Citizen aversion to irradiation is so strong, no major supermarket chain will carry irradiated foods, and all the top poultry companies in the nation have stated they will not adopt the technology. The U.S. government may approve its use, but that doesn't mean citizens will believe it's safe, or that they will buy irradiated food.

Excerpted from the **Food & Water** report **Meat Monopolies: Dirty Meat and the False Promises of Irradiation** by Susan Meeker-
Lowery and Jennifer Ferrara, published by [Food and Water](#).