



Facts about Food Irradiation

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1 Are chemical changes in irradiated foods, such as the formation of radiolytic products, harmful?

1 No. In general, the irradiation process produces very little chemical change in food. None of the changes known to occur have been found to be harmful or dangerous.

Chemical Changes in Irradiated Foods

Some of the chemical changes produce so-called "radiolytic" products. These products have proven to be familiar ones, such as glucose, formic acid, acetaldehyde, and carbon dioxide, that are naturally present in foods or are formed by heat processing. The safety of these radiolytic products has been examined very critically, and no evidence of their harmfulness has been found.

Many scientific tests using highly sensitive analytical techniques have been done over the past 30 years in attempts to isolate and identify radiolytic products caused by irradiation. No substances truly unique to irradiated foods have been identified. The same products are always found, albeit in varying amounts, in fruits, vegetables, meats, and fish, for example, and in many other types of processed and unprocessed foods.

The United States Food and Drug Administration has estimated that the total amount of undetected radiolytic products that *might* be formed when food is irradiated at a dose of 1 kilogray would be less than 3 milligrams per kilogram of food — or less than 3 parts per million. ■

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2 Do the "free radicals" which are produced during irradiation affect the safety of the food?

2 No. There is no evidence to suggest that free radicals, per se, affect the safety of irradiated food.

Free radicals — which in scientific terms are atoms or molecules with an unpaired electron — can be formed during the irradiation process, as well as by certain other food treatments (such as toasting of bread, frying, and freeze drying) and during normal oxidation processes in food. They are generally very reactive, unstable structures, that continuously react with substances to form stable products.

Free radicals disappear by reacting with each other in the presence of liquids, such as saliva in the mouth. Consequently, their ingestion does not create any toxicological or other harmful effects. This has been confirmed by a long-term laboratory study in which animals were fed a very dry milk powder irradiated at 45 kilogray, more than four times the maximum approved dose for food irradiation. No mutagenic effects were noted and no tumours were formed. No toxic effects were apparent in the animals over nine successive generations. Similarly, a toast of bread (unirradiated), which actually contains more free radicals than very dry foods that have been irradiated, can be expected to be harmless. ■

Scientific and Technical References:

Recommendations for Evaluating the Safety of Irradiated Foods, by A.P. Brunetti et al., Final Report prepared for the Director, Bureau of Foods, US Food and Drug Administration, Washington, DC (1980).

"Radiolytic Products — Are They Safe?", by C. Merritt, *Safety Factors Influencing the Acceptance of Food Irradiation Technology*, IAEA TECDOC-490, Vienna (1989).

Safety of Irradiated Foods, by J.F. Diehl, Marcel Dekker, Inc., New York (1990).

