Name:_____ Class:_____ Date:_____

ISSUES AND DECISIONS 8

IS FOOD IRRADIATION SAFE?

In the United States, there are at least 10 million cases of food poisoning reported annually due to deadly bacteria such as *Salmonella*. About 9000 of those cases are fatal. Medical treatment and loss of worker productivity cost the nation billions of dollars each year. During the past several decades, the food processing industry and the federal Food and Drug Administration (FDA) have supported the use of food irradiation to reduce the danger of food poisoning.

Since the mid-1980s, the FDA has approved irradiation of a variety of foods—everything from mangoes to meatballs. The prospect of an irradiated food supply has pleased some people and alarmed others. Although the practice is becoming more widespread, food irradiation continues to be a controversial topic.

Food is irradiated to destroy harmful bacteria or insects in or on the food and to stop the natural process of ripening. The most common radiation source used is radioactive cobalt-60. This substance gives off gamma rays, which are like high-energy X-rays. The radiation dose for most irradiated food ranges from 20,000 to 3 million rads (a measurement of radiation). The latter figure is about equal to the radiation in 150 million chest X-rays. Fruits and vegetables receive 200,000 rads to slow down the ripening process. Potatoes are zapped with about 2 million rads to inhibit sprouting.

During irradiation, gamma rays passing through the food break chemical bonds among atoms and destroy the genetic material in microbes or insects, preventing them from reproducing. Gamma rays also break the bonds of some of the food molecules. However, irradiated food is not radioactive, just as you are not radioactive after undergoing dental X rays! Still, the debate rages over the safety of irradiated food.

OPPOSITION TO FOOD IRRADIATION

Opponents of food irradiation point out that irradiation is not necessary to kill harmful organisms in food. Proper and thorough cooking kills harmful organisms in or on food including both *Salmonella* and *Trichinella*, which can infect pork and cause trichinosis in humans. Opponents further point out that irradiation may actually result in accidental food poisoning. In some cases, it may kill organisms that signal that food has spoiled, without killing other, truly dangerous organisms. A food may therefore look and smell fresh because the odor-causing organisms have been killed by irradiation. Disease-causing organisms, however, may still infect the food.

Evidence has shown that irradiation lessens the nutritional value of food by causing a loss of vitamins. Some people think that this loss of nutrients in irradiated food may have serious consequences. Scientists have noted that food exposed to gamma rays loses vitamins A, C, and E, and certain B vitamins. One study found that animals fed irradiated food lost weight, and that pregnant animals often miscarried—probably because of the food's reduced vitamin E content. In another study, mice fed irradiated chicken had unusually short lifespans and were more likely to develop tumors.

Opponents of irradiation point out that the process alters or creates some chemicals in food. As gamma rays break chemical bonds, the freed chemicals can recombine with other substances. The by-products of this recombination are called *radiolytic products* (RPs), or free radicals. The production of RPs in irradiated food is of concern to some people. When chemical bonds are broken, the number of new RPs that can form during recombination is nearly limitless. How, they ask, can tests be made for the toxicity of substances that cannot be identified? And, how can it be assumed these substances are safe?

Although these unidentified RPs occur in extremely small amounts, no one knows what effect they will have as they accumulate in the body over a lifetime of eating irradiated food. Some of the RPs are known, as are their harmful effects. Biophysicists have identified the following RPs in irradiated food: formaldehyde

(a known cancer-causing agent formed from irradiated starch); peroxides (mutagens found in irradiated plant tissues); and formic acid (a mutagen formed from irradiated sucrose). Opponents of food irradiation argue that no amount of a known cancer-causing substance is safe.

BENEFITS OF FOOD IRRADIATION

Those in favor of food irradiation point out the great value and efficiency of irradiation in wiping out harmful insects and microorganisms that infect food. Irradiated, sterilized food is particularly beneficial for people whose immune system is impaired. In answer to the charge that irradiation destroys nutrients, the proponents point out that cooking food also destroys some nutrients. Also, the nutrient loss caused by irradiation is generally slight. Most scientists agree that food irradiated with 10,000 rads or less of gamma rays shows little or no nutrient loss, even of easily destroyed vitamin C. At greater than 10,000 rads, irradiated food exhibits nutrient loss that is, according to the FDA, generally no more than the loss that occurs in canned or frozen foods.

FDA scientists do admit that some of the RPs that are of concern to opponents are in fact known cancer-causing agents. However, the RPs occur in very minute amounts in irradiated food. A 1980 FDA study showed that no more than 30 parts per million of RPs were found in the irradiated food tested. Most of these RPs turned out to be identical to naturally occurring food substances, and so were considered safe.

As for the problem of being unable to identify all the RPs produced by irradiation, supporters point out that many substances in unaltered food are unidentified. As a biochemist for the FDA asserted, "You can't identify everything that's in an apple. The basis for establishing safety is not absolute safety. It's reasonable safety."

Food irradiation may make the application of harmful insecticides, fungicides, and preservatives to harvested foods a thing of the past. Its use may therefore reduce or eliminate these toxins from the environment. However, pesticides that are used during the growth of the food product may still need to be used.

Grocers, supermarkets, and some poultry producers may benefit greatly from irradiation. Irradiated food has a much longer shelf-life than traditionally treated food. One irradiation company official publicly dined on a 14-year-old packaged ham, and proclaimed it "luscious." By irradiating the meat of chickens and other poultry, farmers who raise the birds could avoid the costs of better hygiene and purer feed.

The controversy over food irradiation may, perhaps, best be summed up by an irradiation proponent who said, "Food irradiation is so good for food *because* it is so dangerous for everything that lives."

REVIEW

In the space provided, answer the following questions.

1. How does irradiation affect organisms living in or on food?
2. What long-term negative health effects of food irradiation are cited by its opponents?
3. What are the health benefits of food irradiation?

DECISIONS

On a separate sheet of paper, answer the following questions.

1. The FDA requires that all irradiated whole foods display the irradiation symbol—a picture of a plant set in a broken circle. Yet, packaged foods that contain ingredients that have been irradiated need not display the symbol. Do you agree with this FDA ruling? How do you think irradiated foods should be labeled?
2. How do you feel about eating irradiated food? Would you buy irradiated food for yourself and your family? What information about irradiated food would help you make your decision?