Two decisions of special interest, the FDA has approved the irradiation of fresh and frozen red meat products to reduce contamination of disease-causing microorganisms. In a related action for industry, government, and consumers, a public-private partnership called “Fight BAC” has been formed to provide a public education campaign to stimulate safe food handling. The latter is designed to emphasize the use of relatively simple food safety steps to be taken by consumers, as they are the last line of defense to ensure the safety of all the foods we eat. The slogan of this campaign is “If you want to stay healthy, you’ve gotta Fight BAC,” e.g., bacteria.

Public announcements will describe how people in their homes can indeed control pathogenic bacteria and the steps to emphasize the need to wash hands and cooking surfaces often to prevent contamination and cook all foods at proper temperatures and keep foods refrigerated promptly.

Food irradiation has been a subject of careful study for many years. In the 1960s the Life Sciences Division–U.S. Army Research Office supported a prolonged study on the protective value of ionizing radiation for foods. The control of disease-causing microorganisms by irradiation has been accepted in other countries. In addition, numerous toxicological and nutrition studies and epidemiologic studies have been carried out in other countries. Taking advantage of this vast database, WHO, in collaboration with FAO and IAEA, convened joint Expert Committees in the 1970s, 1980s, and 1990s. These Committees concluded that irradiation is a physical process for treating foods and is comparable to the heating of foods for preservation. The only unique feature of irradiation is the particular type of energy used. The specific type of energy employed has created special attention regarding wholesomeness of the irradiated food.

However, there is ample evidence that the physical and chemical changes induced by irradiation are essentially the same as those produced in heat-treated foods. The Expert Committee therefore stressed that irradiated foods are not to be considered as “food additives” or as a “contaminant.” The enormous data proved that the nutritional and toxicological studies do not indicate any health hazards. In their 1977 report they carefully described that the types of radiation used were sufficient to reduce the number and/or activity of pathogenic microorganisms. This is also the goal of food safety education today.

The 1980 Committee (WHO, 1981) reaffirmed the recommendations of 1977. They stated that fish, onion, and rice irradiated at the recommended doses were wholesome (meaning toxicologically, nutritionally, and microbiologically harmless). It also recommended that irradiated coca beans, dates, mangoes, pulses, and spices were wholesome. More importantly, they noted that the radiolytic products of irradiated beef, pork, ham, and chicken are essentially identical. The same is true for various starches. These changes are similar to heat-treated foods. Any foods irradiated at a dose not exceeding 10 kGy is considered to be acceptable.

The Expert Committee was presented with evidence on the great similarity in radiolytic products in related foods treated with radiation doses of the order of 10 kGy and on the uniformity of reaction of the protein, lipid, and carbohydrate constituents of foods to radiation. It is considered, therefore, that it is possible to generalize to a considerable extent about the safety of radiation chemistry of foods. Most of the radiolytic products identified in irradiated foods can also be found in nonirradiated foods, and many of these are generated in foods by other processing procedures. The FDA’s recent regulation establishes 4.5 kGy as the maximum permitted dose for irradiation of refrigerated meat and 7.0 for frozen meat. These doses are well below the international codex standards. However, accepting these principles does not mitigate against the questions that might be asked about any new process. Irradiation has been proved to be an acceptable means of processing food and one that does not impair its wholesomeness; however, it may be premature to base an evaluation of a new irradiated food solely on data.
obtained with other foods, even though they may be of closely related types.

There is enormous literature on careful studies of the research carried out or supported by the U.S. Army on the methodology that range from 1965 to 1979. These unclassified papers are available and in the firm conclusions regarding irradiated beef the Technical Committee reaffirms that there is no evidence to suggest that the volatile radiolytic compounds found in irradiated beef would constitute a hazard to the health of the consumer.

The International Society of Regulatory Toxicology and Pharmacology (ISRTP) is a member of The Council for Agricultural Science and Technology (CAST). CAST created a task force to determine the state of knowledge about U.S. food-borne disease risk in 1995. Basically, the report documents the need for improvements in food safety data and the authors agree that the presence of bacterial pathogens in food is a greater health risk than low levels of most chemical residues.

Remarkable is the factual conclusion that scientific advances in testing and epidemiology have improved the overall detection of food-borne disease, but the microbial food-borne disease burden of the United States is still not known with accuracy. While cases are reported to the Centers for Disease Control they are only a small fraction of the actual numbers. The authors’ estimates from the literature indicate that cases in this country likely range from 6.5 to 33 million annually and deaths may be as high as 9000 annually. It is also estimated that costs are in billions of dollars annually.

This striking revelation is in sharp contrast with the estimated hazards and mortality calculated from environmental exposures to chemical substances and pollution exhausts. The report concludes:

A comprehensive system of assessing the risks of human pathogens in the food supply has yet to be devised, said Dr. Tanya Roberts of the Economic Research Services, U.S. Department of Agriculture, co-chair of the task force. “The current lack of information on food-borne disease incidence and severity for each pathogen makes it difficult to define the dimensions and nature of food risks.”

Because control methods affect specific pathogens differently, no one method will eliminate all pathogens and their microbial toxicity from the food chain. Pathogens may be controlled by preventing their entry into food, by reducing the amount present, or by destroying that which is present. The task force recommends that because zero risk is impossible, the public be well educated regarding safe food handling and the changing risk status of individuals. Infants, the elderly, and those with compromised immune systems are at greater risk of food-borne disease.

It is worth noting that a century ago Joseph Lister and Paul Ehrlich discovered these same facts of food contaminated by bacteria as the critical cause of infectious diseases. Obviously, this is a very serious biomedical problem today. We find it puzzling to equate this well-known microbiologic knowledge with the intense emphasis today by environmentalists on the illusion that parts per billion of “chemical insecticides” are the major cause of health hazards from foods.

There has been a major resurgence of interest in all the issues of food pathogens especially by the Animal Health Institute with its large number of members worldwide. This organization is similar to the international Agrow and Agvet programs that address all aspects of marketing and production of crops and animal products that have the goals of meeting the requirements outlined by the CAST reports. The veterinary community appear to be the leader in this far-flung health ambition.

Noteworthy also is the Helsinki 1994 report of the Declaration on Action for Environment and Health in Europe that specifically was concerned about the large number of people in the European region who lack access to safe drinking water as result of microbial contamination. Their number is estimated to exceed 130 million people.

We believe we must continue to carry on research using the latest physicochemical analytic procedures to affirm or refute these earlier conclusions regarding any extrapolating between the many different foods. We need to continue the use of irradiation; however, some safeguards are necessary to ensure that the adaptation of irradiation does not lead to any slackening of the excellent general hygienic practices in the food industry. Research scientists should also remain alert to uncover any potential health hazards; one can never be absolutely sure of safety.

REFERENCES