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בהשתתפות רבנים וחקהילות ולומדי תורה דניו יארק

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The fresh product may not always have more nutrients.

FLASH-HEATED: In the future, complete meals in barrier plastic packages will move from store shelves to microwave ovens.

How Innovations Affect Safety and Nutrition

By JANE E. BRODY

PERSONAL HEALTH

MOST Americans enjoy their year-round access to an extraordinary variety of foods and would complain if they could not, for example, find tomatoes (fresh or canned) in January or orange juice in June. Still, many are concerned about the nutrient losses and health hazards that might result from treating foods so that they don't spoil before reaching a table 5,000 miles or 10 months from where or when the food was produced or packaged.

To the time-honored preservation techniques of salting, drying, smoking, canning and freezing, each of which has its own set of disadvantages, there have been added a dizzying array of newer chemical and physical methods to keep foods "fresh" — from fumigants and preservatives to waxes and plastic wraps to microwaves and radiation.

At one time or another, objections have been raised by consumers and scientists to each of these newer methods. While the objections are sometimes valid and raise health-protecting red flags, in other cases they have prompted people to act irrationally to avoid foods presumed to be unwholesome.

For example, to cater to the "no preservatives" mania spawned by the health food industry, many bread manufacturers stopped using the mold inhibitor calcium propionate in their products. This chemical is a harmless additive; it is naturally produced in large amounts in Swiss and other cheeses, and it is a dietary source of calcium. Without it or a comparable preservative, packaged breads get moldy faster, and toxins produced by molds can be far more dangerous than any preservative legally added to foods.

Some people pay premium prices for fresh produce, which they presume has the most nutrients. In fact, fruits and vegetables harvested at their peak and quickly frozen may contain considerably more nutrients. Orange juice prepared from frozen concentrate often contains more vitamin C than juice squeezed from fresh oranges. Frozen juice is made from tree-ripened oranges, which are richest in vitamin C; fresh oranges shipped north are usually picked underripe to prevent spoilage.

The health-conscious consumer is easily confused by modern food preservation and packaging. What does it mean when a breakfast cereal states "BHT has been added to the packaging material"? How can you tell when produce has been waxed or fumigated or treated with sulfite preservatives or coloring agents that may disguise its true age and condition? On what basis might you accept potential unwanted effects of preservation to obtain nutrients that might otherwise be in very short supply? Here are some factors to consider.

Nutrient Content. While most Americans are aware that foods that look good are not necessarily good for them, they assume that dull, discolored or wilted foods are short on nutrients. To a large extent, this assumption is correct. In general, foods that look freshest are freshest and therefore have the highest nutrient content, at least until you get them home. Unfortunately, in many American kitchens, foods are mishandled: They are poorly wrapped, stored too long and often at the wrong temperatures, then overcooked. The result may be a food with fewer nutrients and less flavor than one out of a can, the preservation method that is hardest on nutrients.

While much of the vitamin C in a food can be destroyed by prolonged cooking at high temperatures, the brief, high-temperature processing techniques used in modern canning have helped to reduce such losses. The high temperatures are needed to destroy microbial cells and spores that could result in fatal food poisoning after vacuum canning. Nutrients that leach from foods into the canning liquid can be reclaimed if the liquid is added to a soup, stew or sauce. A further nutritional disadvantage of many canned foods is their high salt and low potassium content.

Plain frozen vegetables are processed with little or no added salt and tend to have considerably higher levels of potassium and other nutrients than their canned counterparts, at least until the consumer cooks them further. Before packaging, frozen vegetables are blanched with hot water or steam to destroy enzymes that would otherwise destroy vitamins and render the food nutritionally and esthetically undesirable. Frozen foods that have been defrosted can be refrozen safely if they were kept cold when thawed. The food's texture may suffer, but not its nutrient content or safety.

In pasteurization, a 15-second exposure of milk to high temperatures destroys harmful bacteria but leaves nutrients virtually intact. To retain maximum nutrients in milk, it should be stored in the dark in opaque containers. Milk in plastic bottles under fluorescent lights in the supermarket loses much vitamin A and riboflavin.

Canned and frozen foods also lose nutrients during storage; the higher the temperature, the greater the losses. Dr. Dennis D. Miller, food scientist at Cornell University's Division of Nutritional Sciences, advises that to maximize nutrients, "foods, whether fresh, canned, frozen or dried, should be stored at temperatures as low as possible." Leaving fruits and vegetables uncut until just before use also helps to preserve volatile nutrients like vitamin C.

Irradiation has attracted interest as a food preservation technique, in part because the treatment itself is not harmful to nutrients and irradiated foods lose fewer nutrients during storage. Applying a coating of wax to fruits and vegetables may also help to slow the loss of some nutrients.

Chemical additives are sometimes used to retard nutrient losses. For example, sulfites, which have drawn fire recently because some people suffer severe allergic reactions to them, protect vitamin C but accelerate deterioration of polyunsaturated fats and vitamin A.

Although BHA (butylated hydroxyanisole) and BHT (butylated hydroxytoluene) are avoided by some consumers because several studies have suggested they may be toxic or carcinogenic (they are banned in Britain), these antioxidants have also been shown to inhibit the action of cancer-causing chemicals, and BHT has been shown to suppress the growth of harmful viruses.

Spoilage and deterioration. The basic purpose of all food preservation and packaging techniques is to keep food in edible condition for as long as possible. Canning in tin cans and jars, dehydration (regular, sun- and freeze-drying) and freezing are most effective in this regard. However, dehydrated foods are often subject to insect attack, frozen foods eventually dry out, and even canned foods have an acceptable life expectancy of only a few years.

Among short-term preservation techniques, waxing helps somewhat to slow the loss of water from fruits and vegetables. The waxes used, derived from plant and petroleum sources, have all been tested in animal feeding studies and deemed safe in accordance with the Food and Drug Administration's food additives regulations. However, a special review committee said the data were insufficient to determine the safety of carnauba wax, a derivative of palm trees that is used to glaze candy. Other waxes include shellac, polyethylene, coumarone-indene resin and paraffins.

In addition to the wax itself, with some foods fungicides, bactericides, growth regulators and ripening inhibitors, as well as coloring agents (on Florida oranges), can be mixed with the wax when it is applied to the food. For waxed foods such as rutabagas, coconuts, pineapples, avocados, mangoes and bananas, the waxes are not consumed because the peel is removed before eating. But for others, like cucumbers, apples, peppers, tomatoes, oranges, sweet potatoes and eggplant, the skin or rind, along with the wax and chemicals, is often eaten. According to Dr. Corbin Miles of the Food and Drug Administration, such consumption possibilities were taken into account when safety determinations were made.

Dr. Miles conceded that washing a waxed food — even scrubbing it in hot water — is not likely to remove the wax because it has a high melting point and is not soluble in water. One recently approved group of waxy coatings called sucrose fatty acid esters are derivatives of beef fat, which while not a health hazard per se, could cause concern among kosher Jews, Moslems and vegetarians.

Avoiding waxed foods isn't easy. Although F.D.A. regulations require that waxed foods be so labeled, the labeling is on packing crates that are rarely displayed in stores. The agency says it does not have the personnel to police this "low priority" regulation.

Irradiation gets high marks as a spoilage deterrent, although it is presently not used by American food producers. At low levels, radiation kills some spoilage organisms and slows ripening and sprouting of fresh produce. Low-level irradiation can inhibit insect infestations and sprouting. The shelf life of meat, poultry and fish can be extended without significant nutrient losses. At high doses, radiation can totally sterilize a food, theoretically extending its life indefinitely.

At any level, radiation can help to reduce dependence on chemical preservatives, including such potentially harmful ones as nitrates and nitrites.

However, the F.D.A. says that in some cases the metabolic effects of radiation can increase a food's susceptibility to fungal attack and result in changes in flavor and texture.

Microwave ovens may become a popular preserving technique in the future. Dr. Gertrude Armbruster, a Cornell nutritionist, reported that heating a cup of pasteurized milk in a microwave oven for two minutes at full power destroys enough microorganisms to increase its refrigerator life from 10 days to nearly three weeks with virtually no nutrient loss.

Contaminants from packaging and preservation. Cans, plastic wraps and packs, irradiation and chemical preservatives can all introduce undesirable substances into foods. A one-time serious problem of lead leaching into foods from lead-soldered cans has been greatly reduced now that 60 percent of canned foods are being packed in nonsoldered cans.

However, Charles Jelinek, deputy director of the F.D.A.'s Office of Physical Sciences, advises consumers to take all foods out of cans after they are opened and store them in glass or plastic containers. This is especially important if the food is acidic because, once oxygen is present, acid can eat through the protective inner coating.

Plastic packages, both hard and soft, contain "loose" chemicals that can leach into the foods they enclose. The higher the fat content of the food, the more likely such leaching will occur. The F.D.A. treats such migrants as "food additives" and requires that they pass stringent safety tests appropriate to the amount of the substance likely to get into foods.

Since the early 1970's, when the agency banned plastic liquor bottles made of polyvinyl chloride because cancer-causing vinyl chloride was leaching into the drinks, improved manufacturing processes have greatly reduced the amount of vinyl chloride in such bottles, according to Gerad McCowin, director of the Division of Food and Color Additives.

Nonetheless, when plastic is heated, as in boil-in or bake-in bags, higher levels of chemicals are likely to be released, according to Dr. Ellen Silbergeld of the Environmental Defense Fund.

If industry predictions are accurate that by the year 2000 half of all food packages will be made of plastic, this could present another set of health and environmental considerations dealing with disposal. Used plastics can be burned to recapture some of their energy, but may pollute the air.

Chemical preservatives like BHA and BHT that are added to the packaging material can also migrate into foods. Dr. McCowin said these chemicals are treated like direct food additives; they must be tested for safety in animal feeding studies and limits are placed on how much can be present in a particular food.

A major worry about irradiation has focused on the fact that, even though the foods do not become radioactive, substances called "radiolytic products" can be created in the foods. The amount of such products formed depends on how much radiation the food absorbs. The F.D.A. says that at the levels used in preserving foods, the amount of radiolytic products would be so small as to have no bearing on safety or food quality.

While many consumers and some watchdog agencies, like the Health and Energy Institute in Washington, are strongly opposed to food irradiation, others, like Dr. Silbergeld, clearly favor it over most chemical preservatives. "The danger, if there is any, is not to the consumer, but to the workers who may be accidentally exposed to radiation," she said. Additional risks to the population could result from disposal of radioactive wastes.