We often think of food additives as complex chemical substances produced by our modern society. However, the use of food additives dates to ancient times. Early people used salt to preserve meat and fish, herbs and spices to season foods, sugar to preserve fruits, and vinegar to pickle cucumbers.

Today American food manufacturers use nearly 3000 direct food additives. Some of these additives sound familiar like salt, sugar, yeast and vanilla. Others have complex scientific names that may sound unfamiliar, like ascorbic acid, butylated hydroxyanisol (BHA), sodium benzoate, sodium erythorbate and carageenan. Whether familiar or not, all food additives serve a useful function and must be approved by the Food and Drug Administration (FDA) before they can be included in food.

What are Food Additives? A food additive is any substance that becomes part of a food product either directly or indirectly during some phase of processing, storing or packaging. Additives can either be derived from naturally occurring or synthetic materials. Direct additives are purposefully added to food in very small quantities as a result of growing, processing or packaging.

Food additives can only be used for specific purposes. They must serve a useful function. Manufacturers cannot use additives to deceive the consumer by disguising faulty processing or concealing damage or spoilage, nor if alternative manufacturing practices are available that are both safe and economical. Nor can food additives be used if they significantly decrease the nutritional value of the food.

Why are Food Additives Used? Food additives perform a number of functions in food. In general, they can be divided into five categories:

- Preservatives help to keep food fresh and prevent spoilage by controlling bacteria, mold, fungi, yeast or chemical changes.
- Nutrients maintain or improve the nutritional quality of food. For example, vitamins and minerals are added to many common foods like milk, flour, cereal and margarine to make up for those likely to be lacking in a person's diet or lost in food processing.
- Processing aids make products more pleasing by improving the consistency, providing body, adding stability, helping oil and water mix, retaining moisture, or preventing lumping.
- Flavors complement, magnify or modify the taste and aroma of a food. These can include spices, flavor enhancers, natural and synthetic flavors and sweeteners.
- Colors give foods a desired, appetizing or characteristic color.

Using food additives enables manufacturers to produce and distribute convenience foods with increased shelf life and decreased waste. Stabilizers and preservatives make it possible to ship a wide variety of foods all over the world. Nutrient supplementation and enrichment, such as adding iodine to salt, help the nutritional status of those who might not otherwise obtain certain nutrients. Food additives increase the availability, quality and safety of food while keeping costs low.

How are Food Additives Regulated? Food additives are regulated by the FDA under the authority of the Food, Drug and Cosmetic Act of...
Before using a new food or color additive, a manufacturer must petition the FDA for approval. As part of the petition, the manufacturer must prove that the additive does what it is intended to do and is not harmful to humans at the expected level of consumption.

The FDA determines, based on the best scientific data available, if the additive is safe under the proposed conditions of use. If the FDA approves an additive, it issues regulations that may include: the type of food the additive can be used in; the maximum amounts to be used; and the labeling requirements.

The United States Department of Agriculture (USDA) must also authorize additives that are proposed for use in meat and poultry products. After approving a new additive, government officials monitor consumption and keep track of any new research on its safety. The FDA also operates an Adverse Reaction Monitoring System (ARMS) to investigate complaints from consumers, physicians or food companies regarding food additives. The ARMS database helps officials track complaints and determine if a reported adverse reaction represents a real public health hazard associated with food.

There are two categories of food additives that are not subject to the testing and approval process, "prior sanctioned" and "GRAS" substances. Substances designated as "prior sanctioned" were approved by the FDA before the 1958 Food Additives Amendment. GRAS additives (Generally Recognized As Safe) have been extensively used in the past with no known harmful effect and are believed to be safe. Substances on the GRAS list have been under review since 1969 to ensure their safety.

Are Food Additives Safe? Both the government and the food industry are constantly studying the effects of food additives on health. In the levels commonly used, food additives are safe for the vast majority of people. However, just as some people are allergic to certain foods like eggs or wheat, a small percentage of the population may have a reaction to specific food additives. Only a certified specialist can tell you if you are allergic to a substance in food. Reading food labels and requesting additional information from manufacturers should help you avoid substances or foods to which you are sensitive.

Chemicals in Food Packaging
In the same way that the FDA monitors additives in foods, it also monitors packaging that comes in contact with food for transporting, storing or cooking. Manufacturers are required by law to obtain approval from the FDA for all materials used in food packages before they can be marketed.

Sometimes people use food packages for purposes other than FDA-regulated uses - for example, some people will turn bread bags inside out and reuse them to store food or pack lunches. The FDA strongly advises against such use because of the possible risk of lead contamination from the ink on the outside of the bread bag, or contamination from dirty hands, insects or bacteria from other contacts.

Microwave-safe Containers: Consumers are advised not to use plastic containers, which were not intended for microwave use, in the microwave. This would include margarine tubs, whipped topping bowls, take-out containers and other one-time use containers that can warp or melt from hot food, possibly causing chemical migration. Remove food from store wrap prior to microwave defrosting. Foam trays and plastic wraps are not heat stable at high temperatures. Melting or warping from hot food may cause chemicals to migrate into food. Avoid letting any plastic wraps or thin plastic storage bags touch foods during microwaving. Never use brown grocery bags or newspapers in the microwave.

Pesticides
If you have a garden, you know the serious toll that pests, diseases and weeds can take on your backyard harvest. Each year, as much as 45 percent of the world's crops are lost to damage or spoilage. Careful and judicious use of pesticides can minimize these losses, help produce a safe and abundant food supply, and keep a variety of fruits, vegetables, breads and other foods on your table year-round at affordable prices.
What are Pesticides? Pesticides are a group of chemicals designed to control weeds, diseases, insects or other pests on crops, landscape plants or animals. The most commonly used pesticides are insecticides (to control insects), fungicides (to control fungi) and herbicides (to control weeds). Prudent use of pesticides has played a vital role in feeding the world's growing population by dramatically increasing crop yields.

Who Approves the Use of Pesticides? The U.S. Environmental Protection Agency (EPA) is charged by law with regulating the development, distribution, use and disposal of pesticides. Before approving or registering a pesticide for use in growing food, the EPA can require more than 100 different tests - depending on the uses of the pesticide - to determine its safety. The agency registers only those pesticides that meet their standards for human health, the environment and wildlife. If new research shows that any registered pesticide does not meet their standards, the EPA will cancel or modify its use.

How Does the EPA Regulate Pesticide Use? When approving a pesticide, the EPA specifies instructions for its use on the label, which must be followed by law. The agency also establishes a tolerance for each pesticide it approves. A tolerance is the maximum residue level of a pesticide legally permitted in or on a food. A tolerance ensures that, when pesticides are used according to label directions, the remaining pesticide residues will not pose an unacceptable health risk to anyone - from infants to adults - who consumes the food.

Tolerances are considered an enforcement tool and are used by the FDA in its monitoring program to ensure a safe food supply. If any pesticide residue is found to exceed its tolerance on a food, then the food is not permitted to be sold.

The Food Quality Protection Act, signed into law in 1996, now sets an even tougher standard for pesticide use on food. The EPA will consider the public's overall exposure to pesticides (through food, water and in home environments) when making decisions to set standards for pesticide use on food. These new standards are especially intended to protect infants and children who may be more vulnerable to pesticide exposure.

How is Pesticide Safety Determined for Humans? The EPA establishes a reference dose (RfD) for each pesticide it approves for use. The RfD is the amount of a chemical that, if ingested over a lifetime, is not expected to cause any adverse health effects in any population subgroup. The RfD includes a 10- to 10,000-fold safety factor to protect humans over a lifetime including infants, children and other special populations. Using food consumption and other data, the EPA estimates how much pesticide residue is likely to be consumed. If the RfD is exceeded, the agency takes steps to limit the use of the pesticide.

Who Monitors the Food Supply for Pesticide Residues? The FDA enforces pesticide tolerances for all foods, except for meat, poultry and some egg products, which are monitored by the USDA. Laboratory equipment used by these agencies usually can detect residues present at one part per billion - the equivalent of one inch in 16,000 miles - or lower. Over the years, the FDA and other monitoring agencies have concluded that pesticide residues in the food supply are well below established safety standards. California and Florida, where much of the nation's produce is grown, have also confirmed the food supply is safe based on their own monitoring results.

Are Imported Foods Monitored for Pesticide Residues? Each year, the FDA analyzes both domestically produced and imported foods for the purpose of enforcing pesticide tolerances set by the EPA. In 1994, 99 percent of the domestic samples and 96 percent of the import samples had no residues in violation of U.S. safety standards (tolerances). Any food containing residues that exceed the EPA tolerances, or that have not been approved for specific uses, cannot be sold in the United States. Any illegal residues, if found, rarely pose any serious health risks due to the margin of safety built into the EPA's safety standards.

Are Foods Grown With Pesticides Safe? Many independent health experts have examined studies on the effects of pesticides in the diet, including former Surgeon General Dr. C. Everett Koop, the American Medical Association, the American Cancer Society and the American Dietetic Association. These health authorities have concluded that the benefits of a diet rich in fruits and vegetables far outweigh any pesticide-related
risks. In fact, eating 2 cups of fruits and 2½ cups of vegetables daily - as recommended in the USDA's MyPyramid (2005) - can help reduce your risk of cancer and other illnesses. Also, a 1996 report by the National Academy of Sciences concluded that both synthetic and naturally occurring pesticides are consumed at such low levels that they pose little threat to human health.

How Safe are Pesticides Residues for Children? According to the American Academy of Pediatrics, "Despite the theoretical risk of pesticide residues...a diet rich in fruits and vegetables is the most healthful diet that children can consume." Before determining whether a pesticide should be approved for use, the EPA considers children's dietary patterns as well as other differences between children and adults. The agency examines studies using the most sensitive and relevant animal species. If studies suggest children may be harmed by exposure to a pesticide, the EPA will not approve its use.

Does Cooking Affect Pesticide Residues? Food preparation methods used at home and by food manufacturers - such as washing, peeling, cooking, canning, freezing and drying - decrease the pesticide residues of most foods as eaten. Most food manufacturers monitor farmers' use of pesticides to ensure the raw ingredients they buy meet strict quality assurance standards.

How Are Farmers Working to Reduce Pesticide Risks? Today, many farmers are using integrated pest management (IPM) techniques to minimize pesticide use. IPM works in harmony with nature by using "good bugs," such as ladybugs, to destroy "bad bugs" and other natural control methods. Pesticides are used only in limited amounts when pests reach damaging levels, rather than on a routine basis. Many pesticides now being developed use biological or natural substances in the environment to help destroy pests. Research in plant breeding continues to develop heartier, more pest-resistant crops.

Reducing Pesticide Risks: Most pesticides begin breaking down with exposure to sunlight, rain and other elements soon after they are applied. However, to provide an added measure of safety, consumers may take these common-sense steps:

- Select produce that is free of dirt, cuts, insect holes or other signs of spoilage.
- Wash produce in running water (not soap), scrub its skin or peel its outer leaves or skin.
- Eat a variety of foods.

Where Can I Get Additional Information on Pesticides? Check your phone book for your local or regional representatives of the FDA, USDA, EPA, state and county departments of agriculture or the local county Extension service, or check the world wide web for their web sites.

Sources:

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