



MICROWAVE OVENS AND FOOD SAFETY

The Issue

Many Canadians use microwave ovens as a convenient way to thaw, cook and reheat food. A number of people have concerns, however, about the effect of microwaves on their health and on the health and safety of their foods.

Background

Many people who use microwave ovens say they are going to “nuke” their food. This reference to nuclear energy is incorrect and misleading. Microwaves are a form of radiofrequency electromagnetic energy. They are generated electronically. They do not come from radioactive sources and they do not cause food or the oven itself to become radioactive.

When microwaves penetrate food, they cause water molecules in the food to rotate. The rotation causes friction between the molecules and the result is a rapid rise in temperature. This is why the cooking time with microwave ovens is shorter than with conventional ovens. When you shut the microwave oven off, the microwaves disappear.

Health and Safety Concerns Associated With Microwave Cooking

Some microwave energy may leak from your oven while you are using it, but this would pose no known health risks, as long as the oven is properly maintained. The [Need More Info?](#) section below refers to an *It's Your Health* article called [Radiation Safety of Microwave Ovens](#). The article features safety tips to minimize your exposure to microwave energy

when using a microwave oven.

Microwaves do not change the chemical components of in food and so the formation of new compounds, like carcinogens, is not expected. Some studies have been conducted to investigate any possible negative health effects of microwaving foods. These studies, which have been reviewed by Health Canada scientists, have found no evidence of toxicity or carcinogenicity.

In general, the health and safety concerns associated with microwave cooking are similar to the issues involved with other cooking methods, such as conventional ovens, stove-top cooking and grilling. For example, all cooking methods have some effect on the nutrients in food. The effect is worse if you over-cook the food. Microwave cooking tends to be less harsh on nutrients than conventional cooking methods, because the cooking times are shorter and less water is used. To help preserve nutrients when microwaving food, use techniques that promote the even distribution of heat. This will help prevent the formation of “hot spots” where portions of the food could be over-cooked. Steps to promote even heating are outlined in the [Minimizing Your Risk](#) section.

There is no simple answer to questions about which cooking method is best for retaining nutrients. Research into the subject is ongoing. From a health perspective, there is no reason to use any one cooking method exclusively.

Other concerns associated with all methods of cooking, including microwave cooking, are foodborne illness and burns.



Minimizing Your Risk

Foodborne Illness

Raw food of animal origin, such as meats, seafood, poultry and eggs (including juices and drippings) may carry disease-causing bacteria. No matter which cooking method you use, the risk that bacteria will multiply and cause foodborne illness increases when foods are allowed to sit at temperatures in the “danger zone” between 4° C and 60° C (40° F to 140° F) for more than 2 hours. To minimize the risk of foodborne illness:

- When handling raw foods of animal origin, always chill promptly.
- Clean your hands and kitchen surfaces often.
- Keep foods separate and do not cross-contaminate.
- Cook food thoroughly.
- If you use the microwave oven to defrost or partially cook food, be sure to refrigerate or finish cooking the food by some other method right away. Do not let perishable foods linger in the “danger zone” for longer than 2 hours.
- Take steps to ensure that the microwave oven heats food evenly and does not leave underheated areas (cold spots) where bacteria might multiply and cause food poisoning. You can promote even heating in the microwave oven by:
 - cutting food into small pieces for uniform cooking
 - arranging items in a uniform manner
 - adding a liquid (such as water, juice or gravy) to solid foods

- stopping part way through cooking to stir foods or rotate trays or containers
- covering food with a microwave-safe lid or with microwave-safe plastic wrap to trap steam
- following directions for “standing times”. This helps ensure that heat is distributed uniformly, even after cooking.
- Use a food thermometer to check that your food has reached a safe internal temperature. Take the temperature at several locations, especially in the thickest area of the meat, to ensure that the food is cooked all the way through. Make sure that the thermometer is inserted away from bone, fat or gristle.

For example:

- all ground beef products should be cooked to 71oC (160oF).
- food mixtures containing poultry, eggs, meat and fish should be cooked to 74oC (165oF).
- leftovers should be heated to 74oC (165oF).
- Never cook whole poultry, including turkey in the microwave.

Burns

It is always important to be careful when handling or eating hot food. With conventional cooking methods, there are often warning signs that you are dealing with high temperatures. However, your microwave oven is enclosed and you cannot see the source of heat, so you may get a false sense of how hot the food and containers may be.

Therefore, with microwave ovens, there are specific concerns about potential burns related to:

- “superheated” liquids: These liquids are at or above the boiling

point, but look harmless and show no sign (such as bubbling) that the liquid has boiled. When you remove superheated liquids from the microwave oven, they can erupt suddenly and cause serious skin burns.

- heat transfer from food to containers: Many microwave-safe containers and dishware are not heated directly by microwave energy. However, parts of these containers may become very hot due to heat transfer from the food being cooked.
- heating formula in baby bottles: When you heat baby formula in a microwave oven, the outer container (or baby bottle) may feel cool to the touch even though the formula inside is very hot. This can pose a risk of serious burns to the baby.

To minimize these risks when using the microwave oven:

- Be careful when heating liquids and removing them from the oven. Avoid superheating liquids by stopping the microwave oven part way through the heating process to stir the liquid.
- Always use containers labelled as microwave-safe.
- Use protective oven mitts or pot holders when you remove containers/dishware from the oven.
- If you heat a bottle of baby formula in the microwave, be sure to shake the contents and test the temperature of the formula on your own skin before you go ahead with feeding the baby. Health Canada recommends using conventional methods, such as a baby bottle warmer, to heat baby formula. With these



methods, you can use the warmth of the bottle to measure the temperature of the inner liquid more accurately.

Other Concerns regarding Containers and Food Wraps

Some foods come wrapped in materials (e.g., styrofoam) that may not be suitable for use in the microwave. These materials could leach chemicals into your food or cause burns if they melt during microwave cooking. To minimize risks when using your microwave oven:

- Do not re-use trays or containers that come with convenience foods. These are designed for one-time use only.
- Do not use containers intended for cold storage (e.g., margarine tubs) or wrappings that come with packaged foods.
- Make sure the plastic wraps and containers you use are labelled as microwave-safe.

As a general safety precaution, always supervise young children when they use the microwave oven (or any other cooking appliance). Finally, read and follow the manufacturer's directions for using the oven, and keep the oven in good working order.

Health Canada's Role

Health Canada carries out many different activities to minimize risks related to the use of microwave ovens. For example, Health Canada has established a regulation under the Radiation Emitting Devices Act to govern the design, construction and functioning of microwave ovens

that are imported, sold or leased in Canada. This regulation specifies limits for microwave leakage from ovens.

In addition, Health Canada assesses risks, sets standards and monitors the safety record of such products as microwave cooking containers and food packaging materials, and establishes policies on the safety and nutritional value of food. As a founding member of the Canadian Partnership for Consumer Food Safety Education, Health Canada also participates in public awareness campaigns about safe food practices. One example is CanFight BAC™, a program that encourages Canadian consumers to think of food safety at every step of the food handling process, from shopping for groceries to reheating leftovers.

Need More Info?

For information on Food Safety, go to:
<http://www.hc-sc.gc.ca/food-aliment/>

Or contact:
food-aliment@hc-sc.gc.ca

For more information on microwave radiation safety, contact:
The Consumer and Clinical Radiation Protection Bureau
775 Brookfield Road
Ottawa, Ontario K1A 1C1
Telephone: (613) 954-6699
Fax: (613) 952-7584
E-mail:
CCRPB-PCRPPC@hc-sc.gc.ca

For additional information, visit the following Health Canada Web sites:

It's Your Health: Radiation Safety of Microwave Ovens at:
http://www.hc-sc.gc.ca/english/iyh/products/micro_ovens.html

Information on food packaging is available at:
http://www.hc-sc.gc.ca/food-aliment/cs-ipc/chha-edpcs/e_food_packaging.html

Additional information can also be located at:

The Canadian Food Inspection Agency Web site, Food Safety Facts on Microwave Ovens, at:
<http://www.inspection.gc.ca/english/corpaffr/foodfacts/microe.shtml>

CanFight BAC™ at:
<http://www.canfightbac.org/english/indexe.shtml>

For additional articles on other issues go to the It's Your Health Web site at:
www.healthcanada.ca/iyh
You can also call (613) 957-2991