

Microwave Ovens

Should you be concerned about cooking your food using a microwave oven?

Over 90% of homes in the U.S. have microwave ovens used for meal preparation and its use is spreading worldwide especially in developing countries as well. Because microwave ovens are so convenient and energy-efficient, compared to conventional ovens, very few homes and restaurants are without them. In general, people believe that whatever a microwave oven does to foods cooked in it does not have any negative effect on either the food or them.

- *Are microwave ovens really safe to be around?*
- *Is microwaved food really harmless?*

Granted, the microwave ovens we use today are safer, less powerful than those used in the 70s. All microwave ovens manufactured after October 1971 are covered by a radiation safety standard enforced by the Food and Drug Administration. The standard limits the amount of microwaves which can leak from a microwave oven throughout its lifetime. The limit is 5 milliwatts of microwave radiation per square centimeter at approximately 2 inches from the oven surface.

As you move away from a microwave oven, the level of any leaking microwave radiation which might be reaching you decreases exponentially. For example, a person standing 20 inches from a microwave oven would receive approximately $1/100$ the amount of microwaves received at 2 inches.

However even the Food and Drug Administration admits that much is unknown and much research is under way on microwaves and how they might affect the human body. It is a known fact that microwave radiation can heat body tissue the same way it heats food. Exposure to high levels of microwaves can cause painful burns.

Less is known about what happens to people when they are exposed to low levels of microwaves. To find out, large numbers of people

who had been exposed to microwaves would have to be studied for many years. This information is not available. Remember that smoking too was considered harmless a few years ago.

How do microwave ovens work?

Let us first look at how microwave ovens work. Microwaves are a form of electromagnetic energy, like light waves or radio waves. In our modern technological age, microwaves are used to relay long distance telephone calls, TV programs, and computer information across the globe or to an orbiting satellite in space. Microwaves are good for transmitting information from one place to another because microwave energy can penetrate haze, light rain and snow, clouds, and smoke. It is of late used as an energy source for cooking food.

Every microwave oven contains a device called a magnetron, a tube in which electrons are affected by magnetic and electric fields in such a way as to produce micro wavelength radiation at about 2450 Mega Hertz (MHz) or 2.45 Giga Hertz (GHz). This microwave radiation interacts with the molecules in the food.

All wave energy changes polarity from positive to negative with each cycle of the wave. In microwaves, these polarity changes happen billions of times every second. Food molecules - especially water molecules - have a positive and negative end, in the same way a magnet has both a north and a south polarity.

In microwave ovens, as these microwaves generated by the magnetron bombard the food, they cause the polar molecules to rotate at the same frequency, millions of times per second. The molecules within the food - especially the polar water molecules, but also amino acids, lipids and proteins - are forced to align themselves with the rapidly changing alternating electrical field. They oscillate around their axis in response to a reversal of the electric field which occurs billions of times per second. This oscillation creates considerable intermolecular friction which results in the generation of heat.

All this agitation creates ‘molecular friction’, which heats up the food. This unusual type of heating also causes substantial damage to the surrounding molecules, often forcefully deforming them or tearing them apart. It is this friction and heat which can destroy the fragile structure of vitamins and enzymes in the food.

Microwaves from the sun do not create frictional heat, while microwave ovens use alternating current (AC) creating frictional heat.

A microwave oven produces a spiked wavelength of energy with all of the power going into only one narrow frequency of the energy spectrum. Energy from the sun operates in a wide frequency spectrum.

The fact is that Microwaves can seriously deplete the nutrients in food. It is not surprising that microwave heating of food results in losses of nutrients because all fast heating methods have a similar effect. However, microwave heating appears to produce the greatest losses. Microwave heating creates ‘core’ temperatures in excess of 250 degrees C in foods. No nutrient can remain unaffected at this temperature.

Microwaves may also cause pathological changes in our bodies. Once the structure of a food is altered, it is unable to perform the desired function in our bodies. Clinical studies have shown that microwave heating of milk or cooking of vegetables is associated with a decline in hemoglobin levels. Will that kill you? Probably -- not in the short run. Is it good for you? I doubt it. These reductions may contribute to anemia, thyroid deficiency, and rheumatism and other malnutritionally derived diseases.

It is assumed that no chemical effects can be detectable in microwaved nutrients. However, histological studies with microwaved broccoli and carrots have revealed that the molecular structures of nutrients are deformed by high-frequency reversal of polarity, even up to the point of destroying the cell walls, whereas in conventional low heat cooking the cell structures remained intact.

Microwaving may even result in the development of new, hitherto unknown substances. The microwaves-induced reversal of the polarity causes the cells in the nutrients to become destructively polarized, possibly allowing for the creation of free radicals. All free radicals have a strong tendency to cause reactions. They can interact with enzymes thus causing a disruption of biological processes.

In addition, through induction the food itself becomes a carrier and secondary source of technically generated radiation. Studies regarding the luminous power of luminescent bacteria indicated a significant association between the amount of microwave energy in the test foods and the increased energy in the blood serum of test persons who ate that food. The luminous power of luminescent bacteria exposed to serum from these test individuals was significantly greater than that of those individuals who had eaten conventionally heated food or raw foods. This led the authors of the study to the conclusion that such technically derived energies *may* be passed along to man inductively via the ingestion of microwaved foods.

In 1973, two American scientists, P. Czerski and W.M. Leach proved that microwaves cause cancer in animals.

A group of scientists at the Stanford University School of Medicine in California discovered that microwaving breast milk at high temperatures (72°C to 98°C) caused a marked decrease in activity of all the tested anti-infective factors. *E. coli* growth at >98°C was 18 times that of control human milk. Even at 20°C to 25°C, *E. coli* growth was 5 times that of control human milk. Because microwave radiation leads to a significant loss of the immunological properties of milk, the authors of the study concluded that microwaving is definitely “not a suitable heat treatment modality for breast milk”.

Their study on the effects of microwaved food on human beings in comparison to conventionally prepared food showed that food which had been cooked in a microwave oven caused significant changes in the blood immediately after ingestion by the test individuals.