News
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* * * * Researcher clarifies microwaves' effects on animal behavior

DALLAS--Low, presumably safe levels of microwaves can suppress exploratory activity in research animals, and this may have implications for humans, according to a University of Texas Southwestern Medical School scientist.

Dr. Robert Lebovitz, associate professor of physiology at the Dallas school, has been exposing rats in cages with levels of microwaves which, if equated to humans, would be close to accepted safety standards.

At these "low" levels, Lebovitz finds a decrease in some but not all kinds of physical activity.

Purpose of the studies, funded by the U.S. Office of Naval Research and the Bureau of Radiological Health, is to aid in assessing the behavioral effects of long term exposure to microwaves from radar systems such as those aboard naval vessels and planes, in air traffic control towers and in high freqency communications equipment.

"We've found that microwave energy can have a marked effect on an animal's exploratory behavior," says Lebovitz, who began the study in 1977. "Exposed animals will work hard if they are getting a food reward, but otherwise they are less likely to be physically active.

"The primary question we are concerned with is whether the radiation is disturbing or nondisturbing to the animal's behavior--not whether it is harmful or harmless. We know that sufficiently high levels of radiation can be harmful. But the amount we're administering is quite low and comparable to current safety standards; such levels would not be considered harmful. However, we are trying to explore the limits of behavioral effects in the animals, and we're finding behavioral changes at very low levels."

Lebovitz says that even at low radiation levels slight changes in temperature will occur, a physiological factor that is known to shape behavior. Our sensory detection of the heat produced by microwaves is different from that of heat which acts primarily on the body surface. One difference is that microwaves penetrate objects and heat from the inside. Lebovitz explains that microwave heat at low levels may be perceived by the body in unfamiliar and subtle ways, and may affect the body subtly by blunting physical activity.

In areas near radar equipment, such as aboard a naval vessel, exposure to radiation is unavoidable. People simply can't move far enough away from the radar equipment. "We would like to know whether or not radar equipment can affect judgement when personnel are in positions demanding vigilance and attentiveness. And if there is a negative influence, then we need to explore ways for the personnel to compensate for or reduce the effects. Unnecessary lowering of the safety levels could give rise to needless restrictions, additional shielding or lowering of the power in radar equipment, and all of this could present a formidable financial problem," he says. "It is very important to make an accurate assessment of the nature of the potential behavioral effects."

Lebovitz says that while the government and industry are generally careful to meet safety standards, scientists are not in agreement as to what the maximum safety level is. One problem is that it's not clear at this time how to draw conclusions on human behavioral changes from animal studies. A wide variety of behavioral and physiological studies is needed.

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To conduct his behavioral studies, Lebovitz and associates have devised a computerized system of 32 separate "waveguide irradiation chambers" for laboratory rats. Driven from a single source, microwaves are emitted three hours a day during the rats' "work" session. Thirty-two rats in cages made especially for operant conditioning are required to press a bar a precise number of times for food once a light cue is presented. In the same experiments the animals are given exploratory time to work with the bar during an uncued, unrewarded session. This is where the activity level of the irradiated group falls significantly below that of the control group.

A second study being done concurrently by the Southwestern researchers deals with evaluating the effects of microwaves on hearing. It seems that humans and many animals can hear pulsed microwaves. Lebovitz and his team had to ask themselves if there was a "new physiology" involved in why we can hear this form of radiation. The answer to this appears to be "no." So far the experiments support the so-called "thermoacoustic" hypothesis, a proposed mechanism of microwave hearing that depends upon the ear being a superbly sensitive detector of mechanical vibrations. A brief pulse of microwave energy, which is associated with a small but sudden change of temperature, may cause vibrations in the head and inner ear with each pulse. This is in many ways similar to the perception of mechanical, airborne sound. However, with microwave radiation hearing the process of perception starts with a mechanical vibration induced within the head by the arriving microwave energy.

Concerning the safety of microwave ovens, Lebovitz says that as long as they are in good repair there seems to be little danger of radiation escaping. Anyone having any concerns should have their unit checked for leakage of radiation.

"People wonder whether there are strange hidden properties within microwaves of which we're not aware, as was the case with early work with X-rays and radium. So far hidden properties haven't turned out to be of dramatic significance in microwave biological research, but there are a number of biological effects of microwave radiation that are not yet explainable."

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