

**ELECTRIC POWERLINES: HEALTH AND PUBLIC
POLICY IMPLICATIONS**

OVERSIGHT HEARING
BEFORE THE
SUBCOMMITTEE ON
GENERAL OVERSIGHT AND INVESTIGATIONS
OF THE
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
HOUSE OF REPRESENTATIVES

ONE HUNDREDTH FIRST CONGRESS

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**House Subcommittee on Oversight and Investigations
Hearing on Electromagnetic Health Effects
Statement for the Record**

Robert O. Becker, M.D.

In my opinion sufficient data currently exists indicating serious and potentially widespread health effects from the use of electromagnetic energy for power and communication purposes, to require a coordinated research effort and initial regulatory action. In view of the national extent of the problem these initiatives must come from the Federal Government.

While this problem has been subjected to scrutiny in the past all such efforts were flawed by a reluctance to deal with the scope of the issue which resulted in a more stringent standard for validity being applied to positive reports of health effects compared with negative reports of no serious effects. Hence, the conclusions of these studies were vague and equivocal and simply called for more studies. At present the position of the power and communication industries and other parties of interest is similar but, in addition, expresses the opinion that if a problem exists it is relatively minor and does not justify any regulatory action at this time. The reasons given for this position are such statements as, "We have lived with this environmental factor for a long time. If it was harmful then the mortality rate should have gone up. In actuality the mortality rate has declined and Americans are living longer than ever before." These are specious arguments. Mortality rates have declined primarily because of the widespread availability of antibiotics since 1950. The elderly in our population, those over the age of 60, were born in 1930 or earlier. Our use of electromagnetic energy began in 1900 and its growth until 1940 was slow and linear. Prior to World War II, the average house wiring was for a current of 20 to 30 amperes, today such wiring averages about 60 to 80 amperes. Following the technological advances of World War II, the growth in communication uses has increased at a logarithmic rate. Therefore the elderly in our population today were all born and their childhood was spent in a much less hazardous electromagnetic environment than today's.

In the power frequency region the data available provide not only a hazard assessment but evidence for a permissible dose rate as well. The studies of Wertheimer and Leeper, Tomenius, Savitz and, most recently, Matanowski, all relate a significant increase in cancer incidence with either occupational or residential exposure to power frequency magnetic

fields over 3 mG. Additional studies in this area, if they are appropriately performed, appear unlikely to materially add to this body of evidence.

I therefore propose that the following regulatory action be taken at the national level. All new construction; transmission lines, substations, distribution lines, etc. be required to produce no more than a maximum of 1 milligauss in any adjacent dwelling, school or public building. That exposure rates for utility workers, without protective clothing, be limited to a total dose of 1 mG x 8 hours per day. And that the combined utility companies be required to produce a plan of action to bring existing installations of the same type into compliance with these requirements by the year 2000.

Additional research is required to investigate the other potential health effects uncovered by the New York State Power Line Project. I refer particularly to the learning disabilities resulting from the preperinatal exposure of test animals reported by Salzinger. This is urgent in view of the growing number of newborn infants exposed to such fields in electrically heated isolettes and by phototherapy for jaundice. Similarly, the studies by Hansson, Albert and Gona on central nervous system development require further investigation. Not performed in the NYS studies, but also needed, are studies on the effects of similar field exposure on the neurophysiology and neuroanatomy of the aged. If performed, these studies may reveal the need for additional regulatory action to limit exposures in these two critical age groups.

In the RF and microwave regions, there is adequate evidence to indicate harmful effects but work has not progressed to the point where quantitative dosimetry is possible. Therefore definitive regulatory action cannot be proposed except in specific instances. The majority of epidemiological studies (the majority done with inadequate funding) indicate harmful effects, primarily from occupational exposure to mixed sources of non-ionizing radiation. It is urgent that these studies be repeated with adequate funding to obviate present uncertainties. They should be targeted at specific regions of the electromagnetic spectrum. It must be noted that a previous study by Morton (EPA, Grant # R-805832) indicated a significant relationship between leukemia and extremely low levels of commercial FM radiation. Additional, more extensive studies of this type should be undertaken in order to provide an adequate risk assessment.

In the microwave region, however, the work extant casts major doubt on the adequacy of the present exposure guidelines. While various recommended exposure levels are in place, the lowest in this region is 5 mW/cm². Also, it is my understanding that the old thermal level of 10

mW/cm^2 is still applied by the American military. Both Szmigielski's epidemiological studies and the extensive laboratory project done by Dr. Arthur Guy under an Air Force contract indicate hazards at much lower levels than either of these. Guy's work is particularly significant in that it was a controlled experiment involving long term exposure to modulated microwave. The results were that a significantly greater number of cancers and non-malignant tumors occurred in the exposed group.

All official reports on this project, however, stress that the actual cancer rate in the exposed group was at or below the normally expected rate for the species of rat used, and that the incidence rate in the control group was much below the expected norm for spontaneous tumors. This however, must be interpreted in the context of the condition under which the experiment was performed. The animals used in both experimental and control group were gnotobiotic - germ and virus free. The expected norm of cancer incidence in this animal is based upon normal, not gnotobiotic, animals. Since many, if not the majority of animal cancers are the result of virus infections the experimental conditions strongly mediated against the development of spontaneous cancers. The cancers in the exposed group were primarily of the pituitary, thyroid and adrenal glands and the majority of non-malignant tumors were of the adrenal gland. The only viable interpretation of the results is that the experimental animals suffered from such a high degree of chronic stress that the glands of the stress response system became cancerous as a result of their hyperactivity. Since such a state strongly pre-disposes the animals to infectious diseases, one can predict that, had the animals not been gnotobiotic, the entire experimental group would have succumbed to infectious disease and/or cancer prior to the termination of exposure.

Since the power density level in Guy's experiment was approximately $0.5 mW/cm^2$, the results can only be interpreted as indicating that chronic (residential or occupational) exposure to microwave radiation at this level produces the state of chronic stress with all its associated bioeffects. One may conclude that the present permitted level of exposure in the US military services is totally inadequate and should be promptly revised.

In the civilian area, it is urgent that RF and microwave exposure levels in urban, and rural areas where such installations exist, be adequately determined. An excellent opportunity exists in the town of Vernon, NJ where an established overage of genetic defects is present and, despite the recommendations of the Centers for Disease Control issued several years ago, no epidemiological survey has yet been done.

Administrative considerations enter the picture in regard to

laboratory research, environmental monitoring and epidemiological surveys. EPRI, EEPA and DOE are obviously parties of interest in the outcome of any research. EPRI because it represents the industries involved in power generation, transportation and distribution. EEPA because it represents, in addition to the aforementioned group, the manufacturers of equipment and the commercial users. DOE because it is also involved in similar activities as well as being a major consumer of electrical power. Research directly performed or supported by any of these organizations would be viewed as tainted by self interest. Unfortunately, NIH has acquired a similar suspicion, primarily because of the testimony presented by a number of senior NIH staff at a recent legal case concerning a power transmission line. These scientists, none of whom had any experience in research on electromagnetic field bioeffects, testified that there were no such effects and held the proposed transmission line blameless. The Federal Administration is very much a party of interest being one of the major users of the electromagnetic spectrum, particularly in the military area. On many occasions in the past, the Administration provided expert testimony in civilian areas apparently with the intent to forestall the opening up, or legitimizing, the question of health hazards. One can only conclude that these actions were taken to ensure the continued, unrestricted use of this energy by the military.

The EPA, in its now terminated program, displayed some sensitivity to the issue and performed significant research in its own laboratories. It had developed expertise in both the laboratory and field monitoring areas, although in some of its field operations it appeared to be more sensitive to governmental concerns than to those of public health. I urge the reactivation of the EPA program with adequate funding for its expansion to include the entire spectrum of use of electromagnetic energy. Studies that should be performed include; a widespread and complete monitoring of the total electromagnetic environment in representative urban and rural areas, laboratory studies aimed at both elucidating mechanisms of action and determining levels of hazard in laboratory animals, and epidemiological studies in the ELF, RF and Microwave regions of the spectrum. In view of the politicization of the issue and the emotional content that the citizenry is presently displaying, I recommend that at least one, and possibly more, ad hoc external review panels be set up to monitor progress and ensure the adequacy of projects and reports. Furthermore, the entire program must be conducted in a totally open fashion, with all data promptly made available to interested scientists and journalists. To do less will inhibit progress and the ultimate resolution of this difficult problem.