Cellular Phones: Are They Safe to Use?

Resolving the question of whether cellular phones are safe has been complicated by conflicting information about electromagnetic fields (emfs): no danger; yes there is danger; well, we don't know. This has been unsettling for the public and has put pressure on health policy decision makers to act. But can they take action based on the biological data now available? I think not. In fact, I believe it would be unethical to use much of it to make public health decision.

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This area of research in the United States did not evolve as biological research normally does. It basically had its origin in the physics and engineering community's concern about the hazards of their high-power radio equipment in the late 1930s. This led to that community's initiation and substantial control of the funding for biological research and a persisting mind-set. The result has been biological research corrupted by conflicts of interest, research based on implicit assumptions that make little sense biologically, and research inappropriate because of erroneous notions. Even today, the physics and engineering community's mind-set, prominence as spokesmen, and influence over research funding decisions continue. As a consequence, we don't have a credible body of biological data involving electromagnetic fields on which to base public health decisions.

What must be done to provide the decision makers with a biological input? A sampling of documented events will indicate the answer. The key fact is that the mind-set of those who control the funding determines what is looked at and thus what is found. And this must change if we are to obtain the biological data necessary to decide if cellular phones, with the characteristics they have today, are safe to use.

Conflicts of Interest

In the 1980s, Nicholas Steneck, who at the time was director of the Collegiate Institute for Values and Science at the University of Michigan, received a major grant from the National Science Foundation's Program for Ethics and Values in Science and Technology. He and institute fellows in biology and physics used it to do an in-depth case study of this area of research; many of the conflicts of interest they uncovered were documented in two books.[1]

One example is that for many years a U.S. Air Force office has decided what research the Air Force will fund to determine if emf exposure is hazardous. This same office has been responsible for assuring residents that there is no evidence of hazard, when the Air Force wished to place radar (an emf source) in a residential area. Among Steneck's conclusions: "The establishment that controls RF (emf) bioeffects research has misled the public and researchers. ... Key decisions on such research have been influenced by persons with vested interests."

There are unjustified implicit assumptions underlying much of the research. One recent example is the multimillion dollar National Toxicology Program studies on carcinogenesis and promotion of 60-Hz magnetic fields of the National Institute of Environmental Health Sciences (NIEHS). It was assumed, for these studies and many others, that the relevant magnetic field parameter for inducing biological effects is a pure 60-Hz sine wave; and such was used in these studies. But the public is exposed to something very different, as the authors of the Toxicology Program studies admit[2]: "While power line magnetic field exposures are predominantly sine-wave fields, residential and occupational exposures may include square waves, sawtooth waves, and other wave forms. Harmonics (120 Hz, 180 Hz, etc.) may also be found. Further, as appliances are switched on and off, spikes or transients in fields may occur.... This study used linearly polarized, pure sine-wave exposures at 60 Hz, with the fields turned on when the sine wave was at zero amplitude and gradually increased over seven to nine cycles (between 0.11 and 0.15 seconds) to full intensity, and similarly gradually decreased to avoid transients. The NIEHS studies evaluate the predominant component (60-Hz sine-wave magnetic fields) without all the complexities of the exposures that occur in residential and occupational settings." The authors make the implicit assumption that a pure 60-Hz sine wave is the relevant variable. In fact, there is reason to believe this is not true. Others have also concluded from their research that emf characteristics are critical as would be expected with biological organisms.[3]

Another implicit assumption is that a toxicology model (the higher the dose, the more the effect) should be used as a frame of reference in the selection, design and analyses of experiments. Thus experiments are funded to look for a dose-response relationship between electromagnetic field exposure and a biological variable. But is a toxicology model appropriate as a guide for biological research with electromagnetic fields? It's a crucial question, for our frame of reference determines what we look at and how we look; as a consequence, this determines what we find.

Electromagnetic fields are not a foreign substance, a toxin to living beings, like lead or cyanide. Rather, living beings are themselves electrochemical systems that use electromagnetic fields in everything from protein folding through cellular communication to nervous system function. Toxicology is the wrong model as has been detailed in depth.[3]

There are other implicit assumptions that have crippled research in this field. This area of biological research is encumbered, for example, with a vocal few who imagine that they are the possessors of "real truth." They like to talk about the dogma, the "laws of physics." If the data do not conform to the dogma, then the data must be wrong.

But one does not challenge data with the current dogma. That's upside down, it's the dogma that is tested by data obtained with constantly increasing precision of measurement and observation. This is the great leap in thinking that created science out of the thinking of the Medieval Age. It is to be expected that theories conceived at one level of observation will have to be modified as observational ability improves. But some scientists in this area implicitly assume that they have reached a "fundamental" level of understanding, which leaves no room for even more fundamental levels of understanding.

A brief illustration will make this point clear. In 1850, a trip from Washington, D.C., to Los Angeles would have taken more than six months in a wagon pulled by mules. Many times I have had breakfast in Washington and flown 2,500 miles to Los Angeles and arrived in time for lunch. If I went back in time to 1850 and stated the above, I'm sure there would be some physicists who would flatly say that the laws of physics show this is impossible--and then "prove" it with elegant calculations on the muscle energy output of mules and wagon axle friction. They would have been right in their calculations but wrong in their implicit assumption that they knew everything that will ever be known. This kind of thinking has been frequent in this area of research, and it has crippled the research and resulted in misleading information in the literature.

Inappropriate Research

One example is all that is needed to show why so much of the research has been fruitless. Twenty years ago, an epidemiological study indicated power lines may be associated with cancer genesis or promotion. Since then, numerous epidemiological studies with the apparent intent to prove or disprove that emfs cause or promote cancer have yielded conflicting results, yet more are under way.

This is a misuse of epidemiology. Epidemiological studies can't provide proof either way. Physicians do not have a full understanding of cancer genesis and promotion, and we lack emf measurements at individual residences in the years before the diagnosis of cancer. Thus we have critical unknowns. We don't even know what characteristics of the fields, those many years ago, were important and what should be measured. Clearly, endless epidemiological studies of unknowns cannot prove or disprove anything about emfs and cancer.

The foregoing is a tiny sample of the mind-set, conflicts of interest,

implicit assumptions, and inappropriate research, all well documented, that derailed biological research needed to determine if emfs are a health hazard. As a consequence, policy makers don't have the biological data needed to determine if there is a hazard, and the public is confused. And a hundred million cellular phone users, who have not given informed consent, are unwitting guinea pigs in a grand biological experiment.[4] S

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