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Natural Bioelectricity and Effects of Applied Electromagnetic Energy. Fields and Living Systems

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My first point dealt with the nature of frontier science itself, and the rules that need to be followed to do frontier science. The situation is analogous to a player entering a football game, particularly his desire to enter the game and take part in the contest. The idea is to play by the rules after entering the game, not to immediately change the rules according to personal thoughts and ideas. The rules followed by the philosopher, the mystic, and the clinician are all different than the rules of science. Our aim here is to do science that is at the frontier, not to change the nature of the activity itself.

What are the characteristics of the frontier scientist? First and foremost, the frontier scientist is someone who adheres to ordinary concepts of Aristotelean logic, and one who follows the ordinary methods of experimental science. Hypotheses are framed, and statistical hypotheses are evaluated according to *a priori* levels of statistical significance. Anything else is not science.

The frontier scientist, like any scientist, must know the territory to be credible. For a clinician to talk about quantum mechanics, or for the physicist to talk about clinical treatment (using clinical terms) is not credible if it lacks an effort to understand the problems actually being addressed.

I will talk about man-made environmental electromagnetic energy, not focused on specific areas but rather with a broad perspective. I will describe the exposure patterns in the environment, the link to disease, the cellular mechanisms that may be involved, and the impediments that presently exist to progress.

Man-made electromagnetic energy is ubiquitous, pervading the human living space, but is normally encountered with no conscious hint of hazard because we have made it legal to do so unless the exposed subjects went to court and proved hazard. Unlike drugs, the government chose not to require pre-market approval of safety.

The electromagnetic field of a powerline extends 500–1000 feet from the actual line. Consequently, many people live in the actual energy flow of the powerline. Again, the energy that flows along powerlines actually flows outside the wires, not inside them.

Antenna farms are found near virtually any big city in the world. In the beginning, the federal government actually measured the energy levels, and in many cases they were stunningly high, so the government stopped measuring them.

The common presence of fields in the environment is grossly inconsistent with the scientific evidence relating exposure to health problems. This evidence began emerging in the early 1970's. As de Tocqueville once observed, every problem in America, sooner or later, becomes a legal problem. There are many examples of how conflicts between the interests of industry and the public regarding the health risks of electromagnetic energy developed in the United States.

A recent case involves the path of a 345,000-volt powerline through upstate New York. If powerline electromagnetic energy is a health risk, then such a line effectively condemns vastly more land than actually lies underneath the wires. About 61 homeowners along this line have sued the New York Power Company for compensation because of the presence of the health risk. In this case three very prominent scientists who work for the National Cancer Institute were paid up to \$70,000 each to testify that powerlines are safe. We shall see in about two months whether the judge believes them.

There are actually many powerlines located directly adjacent to elementary schools. There is a powerline in Boca Raton, Florida that produces a magnetic field of 3–15 milligauss throughout an adjacent school. This is to be compared with a typical background field which is about 0.1 milligauss. The power company maintains that this high field is safe and the School Board—which received the land on which it built the school as a gift from the power company that built the powerline—maintains that it is safe. Parents in Boca Raton are suing, not for money but to prevent a situation in which their children are forced to attend the school.

When evaluating exposure to electromagnetic energy, one must consider both the strength of the energy and the duration of exposure. In the Boca Raton situation, for example, experts for the power company will testify that the fields present at the Boca Raton school are no different than those encountered in the home. This is a deceitful argument because it does not consider the duration of dose.

In my view, the evidence clearly indicates that electromagnetic energy is a stressor. Hence, reaction to it involves detrimental effects on virtually all body systems. Stressor research in general, and electromagnetic stressor research in particular, has been hampered by the presence of some bizarre views. There are actually people who believe that the body systems are separate, and can be evaluated individually. These views have profoundly retarded development in this area.

How does exposure to man-made electromagnetic energy relate to disease? The answer is that it adds to the total burden that the body's defense systems must bear to resist disease—the energy taxes the body's adaptive capacity.

The chronic effects include blood cancer, nerve cancer, depression and suicide, and neurasthenia.