# HEALTH AND STRESS

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# EPIDEMIOLOGIC STRESS DÉJÀ VU ALL OVER AGAIN?


KEYWORDS: Lipid hypothesis, Leeuwenhoek's animalcules, miasma theory of disease, Louis Slesin, *Microwave News*, amateur radio operators, La Quinta Middle School, high frequency voltage transients, compact fluorescent light bulbs (CFLs), Interphone project, Ross Adey, Bob Becker, Nancy Wertheimer, George Santayana


Several funny things happened to me on the way to this Newsletter, which explains why it is a few days late. I had intended to provide updates on certain topics as promised, but wanted to weave these into some sort of common theme that would make this month's presentation more appealing.

## Also Included In This Issue



In addition, during this period, I was preparing some commentary I had been invited to contribute to the International Atherosclerosis Society on why stress was such an important risk factor for coronary artery disease and atherosclerosis. *The Journal of Inflammation* had requested an article on stress for a special issue on cardiovascular inflammation, and my editorial for the *Journal of Molecular Imaging and Dynamics* dealing with biomarkers for stress was also overdue.

I initially thought that I could use some of the material from these other assignments for this Newsletter if there were some overlap. One of the topics I wanted to revisit was the issue of cell phone safety and the potential dangers of increased "electrosmog" exposure in schools, hospitals, office buildings, airports and churches. The Atherosclerosis Society invitation was to provide a concise commentary to support my view that stress was a much more important risk factor for coronary disease than cholesterol, LDL or CRP. Since cell phone safety had little to do with cholesterol or heart disease, these two topics seemed entirely unrelated. However, in attempting to learn more about the latest findings on cell phone use and brain tumors, I was

frustrated by the difficulty in obtaining accurate, up to date information. It soon became apparent that the reasons for this were remarkably similar to those responsible for perpetuating the fallacious fatty diet→cholesterol→heart attack hypothesis. For example, this sequence of events was popularized by Ancel Keys in his famous Seven Countries Study, which showed an amazing straight-line correlation between increased saturated fat intake, elevated blood cholesterol and higher heart attack death rates. His study was, and still is, cited as definitive proof of the lipid hypothesis. The problem was that Keys had data from 22 countries, and had cherry picked 7 to prove his preconceived conclusion. Had he selected seven others, he would have reached the exact opposite conclusions. The Framingham study subsequently reported that the more fat and cholesterol one ate, the lower the blood cholesterol. The 21 country 10 year MONICA epidemiologic study reported that **every single country with the lowest fat consumption had the highest mortality rates from heart disease**, and **those with the most fat consumption had the lowest death rates**.

There was obviously something terribly wrong with epidemiologic research if the same study could be manipulated to come to different and even opposite conclusions. This also seemed to be the case with the Interphone project to assess cell phone safety. The more I researched this, the more similarities I found with the cholesterol campaign, such as conflicts of interest, deceptive advertising, ruthless retaliation for any opposition and, especially, biased epidemiologic studies that reached erroneous results. And in thinking about why 90% of medical research reports can't be believed, (see December 2010 Newsletter), it was clear that epidemiological errors were a major contributor. Epidemiology literally means "the study of what is on the people", and such studies are helpful in discovering possible causes of illness in various populations. However, it is important to emphasize that **no epidemiologic study can ever prove what caused a disease in any given patient**. There may be a statistically significant association, as occurs with cholesterol and heart disease, or cell phone use and brain tumors, but that does not prove causation, as is often implied today.

## The London Broad Street Cholera Epidemic And Puerperal Fever In Vienna

Early epidemiologic studies that sought to explain why people got sick were rejected since they differed from established views. The ancient Greeks believed that illness resulted from a disturbance in the four humors that upset their normal equilibrium. The Chinese attributed disease to some obstruction in the orderly circulation of *Qi* energy through prescribed pathways in the body, or an imbalance between its complementary *yin* and *yang* components. Western illnesses were often viewed as punishment for committing some sin or violating some taboo. However, during the 14$^{th}$ century, when the bubonic plague spread through southern Spain, one

Moorish physician prophetically attributed it to "certain minute creatures that cannot be seen by the eyes, which float in the air and enter the body through the mouth and nose." Another, who was even more specific, wrote,

> The existence of contagion is established by experience, investigation, the evidence of the senses and trustworthy reports. These facts constitute a sound argument. The fact of infection becomes clear to the investigator who notices how he who establishes contact with the afflicted gets the disease, whereas he who is not in contact remains safe, and how transmission is affected through garments, vessels and earrings.

Anton van Leeuwenhoek first identified microscopic living organisms that he called animalcules in 1675. In 1700, Nicolas Andry proposed that parasitic microorganisms, he referred to as "worms", might be responsible for smallpox and other contagious diseases. The first epidemiologic study showing that diseases could be contagious was conducted in 1854 by John Snow. Snow was among the early physicians to use ether and chloroform as anesthetics, and personally administered chloroform to Queen Victoria during the birth of her last two children. When the cholera plague struck London, it was generally believed to be due to "bad air", which was frequently found in areas near cesspools that had poor drainage. This was consistent with the prevailing miasma (air pollution) theory that dated back 2000 years to Galen. Snow, who had carefully studied how the disease had spread, was skeptical that it was airborne, and thought it was more likely to be "propagated by morbid poison entering the alimentary canal."

(Courtesy of Microwave News)

After talking to local residents he identified the source of the outbreak as the public water pump on Broad Street. In his map to the left, the black bars indicate cholera cases and the blue circles show the location of neighborhood water pumps. The one in the middle is the Broad Street pump that was responsible for all the cases. Snow's microscopic and chemical analysis of water from this pump did not reveal any dangers, and since the germ theory would not be proposed until 1861, he had no idea how the disease was transmitted. However, his meticulous study of the pattern of disease distribution was so convincing, that he persuaded the local authorities to disable the well pump by removing its handle.

It was later discovered that this well had been dug only three feet from an old cesspool that had begun to leak fecal bacteria. It was common at the time to have a cesspool under homes and not all of these had been replaced by drainpipes that emptied directly into a recently installed sewer system. Most families tried to have their raw sewage collected and dumped in the Thames to prevent it from filling up faster than the sewage could decompose into the soil, but this was not always possible. Although the cholera epidemic disappeared soon after the Broad Street pump was inactivated, government officials rejected Snow's theory of the oral-fecal transmission of disease, as did most physicians, and the Broad Street pump handle was subsequently replaced. Snow died in 1858, without knowing that the bacillus that caused cholera had been discovered in 1854 by Fillipo Pacini, an Italian anatomist who found it in the intestines of cholera victims but didn't know its significance. His report was never translated into English and it was not until 1884, when Robert Koch isolated, and cultured *Vibrio cholerae,* that Snow was finally vindicated. Although criticized and not fully appreciated in his lifetime, a 2003 survey by *Hospital Doctor* magazine voted John Snow as the "greatest doctor" of all time, with Hippocrates coming in second.

During the same period that Snow was investigating cholera in London, Ignaz Semmelweis was attempting to find the cause of puerperal (childbed) fever in Vienna. Semmelweis made the connection between the disease and examinations of delivering women by doctors who had usually come directly from autopsies. Since he suspected that it was a contagious disorder transmitted by autopsy material, he made doctors wash their hands with chlorinated lime water before examining pregnant women. During the following 12 months, the mortality rate from septicemia due to puerperal fever at his hospital dropped from 19% to essentially zero. Although Semmelweis did not publish these results, news of his achievements spread throughout Europe in 1848 via anecdotal reports from his colleagues and students. As a result, he was optimistic that his chlorine hand washing procedure would be widely adopted and save tens of thousands of lives. Instead, he met with surprising resistance since, like Snow, he could not explain his results and this was before microbes had been shown to cause disease. In addition, physicians resented his accusations that they were responsible for the deaths of their own patients. As a result, he was severely persecuted and eventually committed to an insane asylum, where he was put in a straight jacket and severely beaten by several guards. He died two weeks later at age 47 due to a gangrenous wound, most likely resulting from his beatings. Autopsy revealed extensive internal injuries and, ironically, septicemia was listed as the cause of death. Today, like Snow, Semmelweis is one of the most revered and honored physicians not only in Austria and Hungary, but internationally.

## Sam Milham's "Dirty Electricity" And Other Epidemiological Triumphs

I doubt that Sam Milham, MD, MPH will achieve the same degree of fame as these two pioneers, but his epidemiologic achievements may be even more important from a public health standpoint. I am indebted to Louis Slesin, Editor of *Microwave News* for calling this to my attention and for furnishing the illustrations used in this issue. Lou has been publishing *Microwave News* for over three decades, and it has become the resource for unbiased and up to date information on the health risks of all types of electromagnetic fields. I was naturally interested in Lou's assessment of the latest results from the cell phone-brain tumor Interphone Study, but got sidetracked by his review of Sam Milham's amazing accomplishments. I can only summarize some of the highlights of this due to space constraints, and would urge all of you to read his full account at www.microwavenews.com/milham.html/

Sam Milman spent most of his career at the Washington State Department of Health and was the first to link various occupational cancers to exposure to electromagnetic fields. It started with a 1982 *New England Journal of Medicine* report on increased deaths from leukemia in electrical workers that came from a database of occupational mortality that he had developed. This stimulated many other groups to examine their own data, which not only confirmed his findings, but also found a link between EMF exposure and brain, breast and lung cancers. By 1990, a dozen papers linked EMFs to brain cancer alone, and there are now well over 100 linking workplace exposure to various cancers. In 1995, a large study of electric utility workers showed higher mortality rates from brain cancer but not leukemia. The report had been funded by the Electric Power Research Institute, which concluded that since some studies suggested a link with brain cancer or leukemia but others did not, there was no consistency, so that all these studies must be wrong. Subsequent epidemiologic studies, many of which were also funded by industry sources, also had conflicting conclusions, so that one can find support for any opinion about safety.

What was particularly frustrating, is that Sam discovered early on that **workers presumably at significantly increased risk of cancer were apparently not interested in learning more or in assisting him to help others**. When he initially reviewed his Washington State data, and before his *New England Journal of Medicine* letter, he had written to the safety director of the International Brotherhood of Electrical Workers asking for help to "confirm or refute" the leukemia risk he suspected. The membership would find what they needed to know about job safety and possibly how to improve it, at no cost to the union. He was turned down flat. Five years later, after others had confirmed his findings, he made another attempt and was again refused. Puzzled, he subsequently approached the president of the union, but was unable to make any headway.

Sam then decided to investigate amateur radio operators, another EMF-exposed group, in a rather ingenious way that did not require their cooperation. He studied the records of the ARRL (American Radio Relay League), which had over 150,000 members, by collecting the death notices published in their monthly magazine and matching them with death certificates. He again found an increase in leukemia that he reported in a 1985 letter to *The Lancet*, which concluded that there was now "further support for the hypothesis that electromagnetic fields are carcinogenic." Since he wanted to do a larger study he contacted the ARRL directly to ask for access to their records. But in addition to also flatly rejecting his request, the organization wrote their own letter to *The Lancet* describing his cancer concerns as "purely speculative". Sam didn't give up, and realized that since amateur radio operators must be licensed by the Federal Communication Commission, much of the information he needed would be available in their computer records that he could gain access to. Analysis of this database of close to 70,000 radio operators in Washington and California confirmed an impressive increase in deaths from leukemia in addition to higher rates of Hodgkin's disease, multiple myeloma and other lymphatic and hematopoietic cancers. The results were published in a 1988 issue of the *American Journal of Epidemiology*, one of the preeminent publications in this field, and subsequent articles by others have reached similar conclusions. Despite this, AARL continues to deny that there might be a problem.

These and other potential adverse effects of exposure to electromagnetic fields are detailed in Sam's recent book, *Dirty Electricity: Electrification and the Diseases of Civilization*. It explains how, early in his career, he was inspired by John Snow's triumph over cholera. As a result, he had decided to devote his efforts to preventing illness using epidemiology to find its cause, rather than being a practicing physician who treated diseases after they occurred. During the course of his investigations, he found that: workers handling weapons grade plutonium contracted multiple mesothelioma; aluminum reactor plant workers developed leukemia and lymphoma; electrical workers and amateur radio operators died of leukemia; secretaries using electrical typewriters had higher rates of breast cancer; as did male Marines who did clerical work. He believed that the common thread in these different malignancies was that all these workers had been occupationally exposed to unusual levels of various forms of electromagnetic radiation. He also wrote several papers dealing with this topic, including:

- Magnetic Fields From Steel-Belted Radial Tires: Implications for Epidemiologic Studies
- Historical Evidence That Residential Electrification Caused the Emergence of the Childhood Leukemia Peak

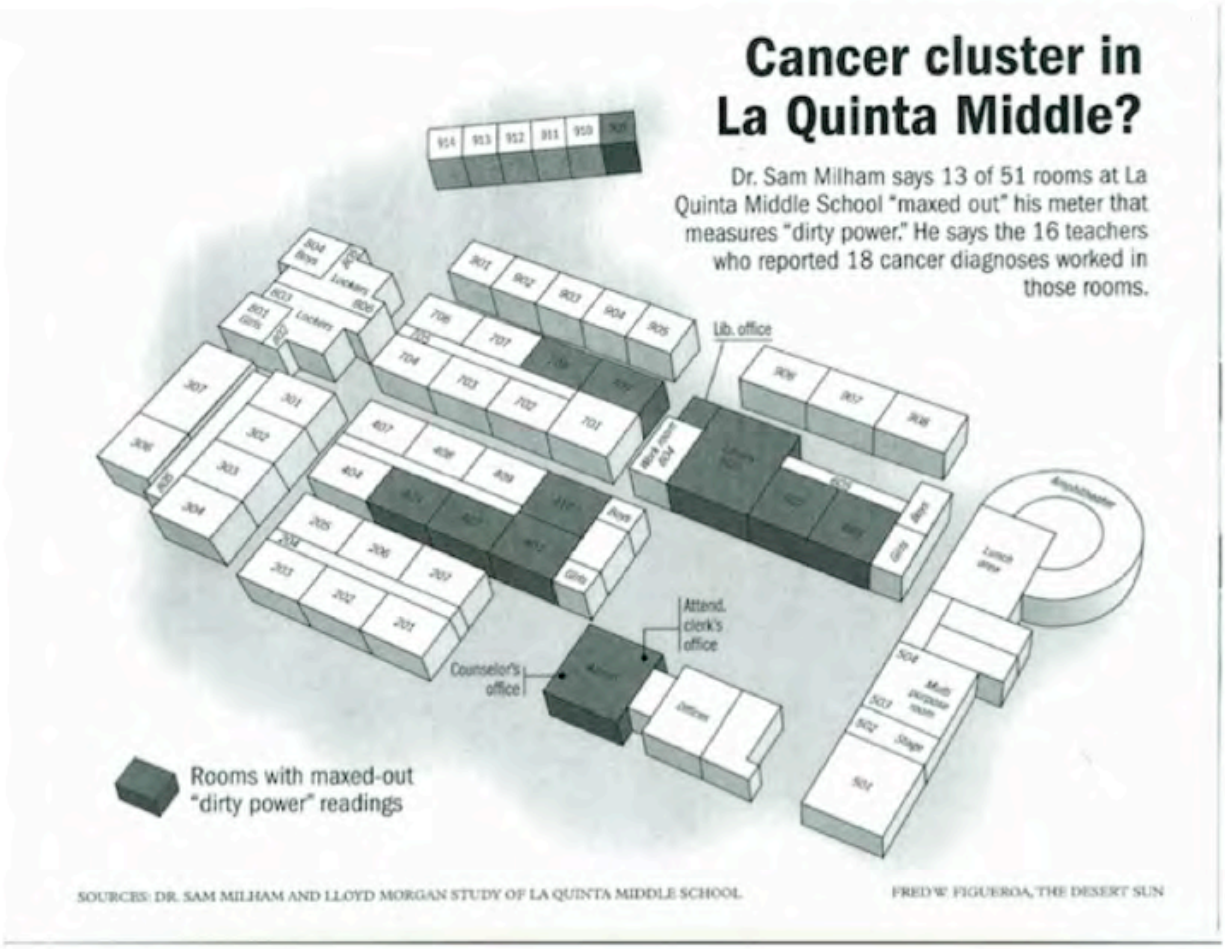
- Most Cancer in Firefighters is Due to Radio-Frequency Radiation Exposure Not Inhaled Carcinogens
- Amyotrophic Lateral Sclerosis (Lou Gehrig's Disease) is Caused by Electric Currents Applied to or Induced in the Body
- **A New Electromagnetic Exposure Metric: High Frequency Voltage Transients Associated With Increased Cancer Incidence in Teachers in a California School**

I have highlighted this last paper, since it is particularly fascinating. Sam had retired in 1992 and spent his winters in Southern California to escape the harsh Washington weather. He read about a cluster of cancer cases in a local La Quinta school that had been built in 1988. By 2005, 16 staffers among the 137 who worked at the new school had been diagnosed with 18 cancers, a ratio nearly 3 times the expected number. About a dozen cancers had also been detected among former students and there had been several deaths. Sam was especially interested in measuring the ambient levels of a particular kind of EMF; a relatively **new suspected carcinogen known as high-frequency voltage transients, or "dirty electricity."**

These high frequency voltage transients are largely the byproducts of modern energy-efficient electronics and appliances, ranging from computers, refrigerators, and plasma TVs to compact fluorescent light bulbs and dimmer switches, all of which tamp down the electricity they use. This manipulation of current can create a wildly fluctuating and potentially dangerous electromagnetic field that not only radiates into the immediate environment, but can also flow back along home or office wiring all the way to the utility that affects every energy customer in between. Sam first became aware of this at a 1994 conference in which Gilles Thériault, Chair of Occupational Health at McGill, reported a tenfold increase in cancer in electrical utility workers that he attributed to high voltage electromagnetic transients. Hydro-Québec, the Canadian electric utility that funded the study, was so furious that these results had been made public, that it stopped all further studies on transients and confiscated all the data. Thériault and Sam Milman protested but received little additional support, since nobody wanted to alienate industry executives who were essentially the only source of funding for EMF epidemiologic studies.

In commenting on these transient EMFs at the 1994 conference, Thériault told *Microwave News* "We keep seeing smoke but we have not identified the fire. And there is fire out there. One day, we will put our finger on it." When Sam read about the La Quinta Middle School cancer cluster, he suspected that this day might have finally come. He met with the teachers and took detailed notes about the nature and dates of their malignancies, duration of

exposure to possible classroom and other sources of EMFs. He took readings in different classrooms after hours and was astonished to find that **in some, the "dirty electricity" levels were too high for his meters to measure**. And just as John Snow had done in London, he mapped out the rooms where the teachers with cancer worked, and then determined which rooms had the highest amounts of dirty electricity, as illustrated below.




Although the legend above confirms that all the teachers who reported 18 cancer cases worked in the "maxed out" dirty rooms, a more compelling statistic is that teachers who ***ever*** worked in one of these rooms, over a ten-year or longer period, had seven times more cancer than would be expected by chance. The final analysis, reported in the August 2008 issue of the *American Journal of Industrial Medicine*, was **that cumulative exposure to transients in the school increased the likelihood a teacher would develop cancer by 64%.** A single year of working in the building raised risk by 21% particularly for melanoma, thyroid and uterine cancer, which could be up to 13 times greater than normal. Although not included in the tabulations, the risks for young students were probably even higher.

Sam's preliminary findings prompted the teachers to file a complaint with the Occupational Safety and Health Administration, which in turn ordered a full investigation by the California Department of Health Care Services. However, based on past experience, nothing is likely to happen. School District officials have adamantly denied claims, criticizing his measurement tools and science as "inconsistent with the accepted research on electricity and disease." A local certified industrial hygienist said that talk about "dirty power" was bogus and "a description of something that doesn't exist." That's not surprising since little has been published on this. One indication of an energy-efficient device is the ballast, or transformer, that is often found near the end of a power cord on a laptop computer, printer, or cell phone charger When plugged in, it's warm to the touch, an indication that it's tamping down current and throwing off transient pollution when the current is repeatedly interrupted. Two of the worst creators of transient radiation are light dimmer switches and compact fluorescent light bulbs (CFLs), which **save energy by turning itself on and off as many as 100,000 times per second**. Not much is known about how this pulsing radiation affects the body, but as one authority has suggested, "Opposite charges attract, and like charges repel. When a transient is going positive, the negatively charged electrons in your body move toward that positive charge. When the transient flips to negative, the body's electrons are pushed back. Remember, these positive-negative shifts are occurring many thousands of times per second, so the electrons in your body are oscillating to that tune. Your body becomes charged up because you're basically coupled to the transient's electric field."

All communication in the body, whether it involves insulin secretion or immune system responses, ultimately takes place via weak electrical signaling, and there is concern that this could be disrupted by these "dirty electricity" transient pulsating positive-negative shifts. One researcher has reported that exposure to such high frequency transients elevates blood sugar in diabetes and prediabetes and that multiple sclerosis patients have improved balance and fewer tremors after a few days in a transient free environment. In addition, after schools installed filters to clean up transients, two-thirds of teachers reported improvement in headache, dry eye, facial flushing, asthma, skin irritation and depression that had been chronic complaints. High frequency transients are insidious because they can accumulate and strengthen, and since they travel along home and utility wiring, your neighbor's electrical choices, such as compact fluorescent bulbs that illuminate a porch down the block, can increase the "electrosmog" in your bedroom. Electrical current must travel along a complete circuit and most all current going out on wires returns to substations via the earth. If this energy encounters subterranean conductors such as water, sewer, and natural-gas pipes, these can introduce more electrical pollution into your home.

**"Those Who Cannot Remember The Past Are Condemned To Repeat It"**

Of course, nobody wants to give up their cell phone, BlackBerry, computer, iPad, microwave or any of the electrical appliances we rely on daily, and in some cases, have become addicted to. Save for a few people who are truly electro-sensitive and others who have visual or musculoskeletal complaints due to excess use, there is no proof of adverse health effects from any of these. Government officials and agencies constantly reassure us that there are no concerns about safety based on epidemiological studies, and with good reason. One can only imagine what the socio-economic repercussions might be if cell phones were banned based on epidemiologic studies showing a clear link to brain tumors and other malignancies. We have a long history of ignoring the potential dangers of radiation, dating back to the discovery of radium, which eventually led to the death of Marie Curie. Radium containing waters, tonics, enemas and soaps were popular in the 1920's and 1930's; stores used x-ray machines to fit shoes in the 40's; and radioactive wristwatches with glowing hands were common in the 50's. And although scientists were concerned about these and the health hazards of smoking, asbestos, diethylstilbestrol (for pregnant women) and PCB's for years, official warnings could not be made without some proof of harm.

We also recognize that tobacco, asbestos and other carcinogens can have a latent period of two decades or more before clinical disease surfaces. It is doubtful that any epidemiologic study could confirm the adverse health effects for cigarettes in a population that only smoked for ten years or less and the same likely holds true for electromagnetic field exposure. As emphasized in a previous Newsletter, U.S. safety standards were established by the very industries they were designed to govern, and are not as strict as those for other developed countries. Electrical power, telecommunication and wireless industry advocates have also infiltrated Congress, regulatory agencies, academia, the media and prestigious organizations, just as the cholesterol cartel has done so successfully. Similarly, anyone with opposing views is derided and even persecuted, including pioneers like Ross Adey, and Bob Becker who warned about the dangers of non-ionizing radiation, and Nancy Wertheimer, who more than any other epidemiologist, was responsible for demonstrating the association between electromagnetic fields and childhood leukemia. Another problem is that if someone did have symptoms related to EMF exposure it would be difficult to convince friends, family and especially doctors. Much like the tree falling in the forest phenomenon, **a disease does not exist until it has a name,** which usually requires finding some mechanism. There is also the danger that exaggerated hype about EMF dangers will lead to anxious and neurotic individuals complaining of illnesses that do not have an organic basis. And because of confusion, patients may avoid therapeutic EMF devices that have been proven to be safe and effective.

As the old saying goes, "He who pays the piper calls the tune", and since industry funds the vast majority of research into the health effects of electromagnetic fields, it is not surprising that *Radiation Research* has published such a preponderance of articles about the absence of EMF harm, that it was nicknamed "the journal of negative results". The wireless phone industry paid some $28 million during the 1990's to conduct an independent study over which they had no control, to determine whether cell phones caused cancer. Although the results were allegedly positive, nothing was done. The Interphone project involves scientists from 16 study centers in 13 countries that are also conducting independent studies to provide a definitive answer to whether cell phones cause brain tumors. It began in 1999 and the results were to have been published in 2005 and 2006, and although some are still not available, significantly increased risk has already been reported. This study was also funded by the Telecom industry and since "He who has the gold, makes the rules", no matter what the final results show, many observers feel that, based on past experience, nothing will happen. *Plus ça change plus c'est la même chose*. (The more things change, the more they stay the same). And, as George Santayana and others remind us, those who do not learn from the mistakes of history are doomed to repeat them.

Some believe that we may be engaged in one of the most dangerous public health experiments ever, especially with respect to children who are particularly sensitive to the effects of electromagnetic fields. It may take decades to find out if these fears are justified, and the question is what should be done in the interim? As might be expected, an entire industry has sprung up promoting chips, gadgets, pendants and jewelry that purportedly block harmful radiation, all of which are bogus. Until we know more, the best advice appears to be to limit exposure, especially for children. It is never a good idea to stand in front of a microwave oven. The Interphone results may provide some answers, but since we seem to have run out of space, hope to discuss this fiasco in a subsequent issue — so stay tuned!

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