

The Largest Biological Experiment Ever

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In 2002, Gro Harlem Brundtland, then head of the World Health Organization, told a Norwegian journalist that cell phones were banned from her office in Geneva because she personally becomes ill if a cell phone is brought within about four meters (13 feet) of her. Mrs. Brundtland is a medical doctor and former Prime Minister of Norway. This sensational news, published March 9, 2002 in Dagbladet, was ignored by every other newspaper in the world. The following week Michael Repacholi, her subordinate in charge of the International EMF (electromagnetic field) Project, responded with a public statement belittling his boss's concerns. Five months later, for reasons that many suspect were related to these circumstances, Mrs. Brundtland announced she would step down from her leadership post at the WHO after just one term.

Nothing could better illustrate our collective schizophrenia when it comes to thinking about electromagnetic radiation. We respond to those who are worried about its dangers — hence the International EMF Project — but we ignore and marginalize those, like Mrs. Brundtland, who have already succumbed to its effects.

As a consultant on the health effects of wireless technology, I receive calls that can be broadly divided into two main groups: those from people who are merely worried, whom I will call A, and those from people who are already sick, whom I will call B. I sometimes wish I could arrange a large conference call and have the two groups talk to each other — there needs to be more mutual understanding so that we are all trying to solve the same problems. Caller A, worried, commonly asks what kind of shield to buy for his cell phone or what kind of headset to wear with it. Sometimes he wants to know what is a safe distance to live from a cell tower. Caller B, sick, wants to know what kind of shielding to put on her house, what kind of medical treatment to get, or, increasingly often, what part of the country she could move to to escape the radiation to save her life.

The following is designed as a sort of a primer: first, to help everybody get more or less on the same page, and second, to clear up some of the confusions so that we can make rational decisions toward a healthier world.

Fundamentals

The most basic fact about cell phones and cell towers is that they emit microwave radiation; so do Wi-Fi (wireless Internet) antennas, wireless computers, cordless (portable) phones and their base units, and all other wireless devices. If it's a communication device and it's not attached to the wall by a wire, it's emitting radiation. Most Wi-Fi systems and some cordless phones operate at the exact same frequency as a microwave oven, while other devices use a different frequency. Wi-Fi is always on and

always radiating. The base units of most cordless phones are always radiating, even when no one is using the phone. A cell phone that is on but not in use is also radiating. And, needless to say, cell towers are always radiating.

Why is this a problem, you might ask? Scientists usually divide the electromagnetic spectrum into “ionizing” and “non-ionizing.” Ionizing radiation, which includes x-rays and atomic radiation, causes cancer. Non-ionizing radiation, which includes microwave radiation, is supposed to be safe. This distinction always reminded me of the propaganda in George Orwell’s *Animal Farm*: “Four legs good, two legs bad.” “Non-ionizing good, ionizing bad” is as little to be trusted.



An astronomer once quipped that if Neil Armstrong had taken a cell phone to the Moon in 1969, it would have appeared to be the third most powerful source of microwave radiation in the universe, next only to the Sun and the Milky Way. He was right. Life evolved with negligible levels of microwave radiation. An increasing number of scientists speculate that our own cells, in fact, use the microwave spectrum to communicate with one another, like children whispering in the dark, and that cell phones, like jackhammers, interfere with their signaling. In any case, it is a fact that we are all being bombarded, day in and day out, whether we use a cell phone or not, by an amount of microwave radiation that is some ten million times as strong as the average natural background. And it is also a fact that most of this radiation is due to technology that has been developed since the 1970s.

As far as cell phones themselves are concerned, if you put one up to your head you are damaging your brain in a number of different ways. First, think of a microwave oven. A cell phone, like a microwave oven and unlike a hot shower, heats you from the inside out, not from the outside in. And there are no sensory nerve endings in the brain to warn you of a rise in temperature because we did not evolve with microwave radiation, and this never happens in nature. Worse, the structure of the head and brain is so complex and non-uniform that “hot spots” are produced, where heating can be tens or hundreds of times what it is nearby. Hot spots can occur both close to the surface of the skull and deep within the brain, and also on a molecular level.

Cell phones are regulated by the Federal Communications Commission, and you can find, in the packaging of most new phones, a number called the Specific Absorption Rate, or SAR, which is supposed to indicate the rate at which energy is absorbed by the brain from that particular model. One problem, however, is the arbitrary assumption, upon which the FCC’s regulations are based, that the brain can safely dissipate added heat at a rate of up to 1 degree C per hour. Compounding this is the scandalous procedure used to demonstrate compliance with these limits and give each cell phone its SAR rating. The standard way to measure SAR is on a “phantom” consisting, incredibly, of a homogenous fluid encased in Plexiglas in the shape of a head. Presto, no hot spots! But in reality,

people who use cell phones for hours per day are chronically heating places in their brain. The FCC's safety standard, by the way, was developed by electrical engineers, not doctors.

The Blood-Brain Barrier

The second effect that I want to focus on, which has been proven in the laboratory, should by itself have been enough to shut down this industry and should be enough to scare away anyone from ever using a cell phone again. I call it the “smoking gun” of cell phone experiments. Like most biological effects of microwave radiation, this has nothing to do with heating.

The brain is protected by tight junctions between adjacent cells of capillary walls, the so-called blood-brain barrier, which, like a border patrol, lets nutrients pass through from the blood to the brain, but keeps toxic substances out. Since 1988, researchers in the laboratory of a Swedish neurosurgeon, Leif Salford, have been running variations on this simple experiment: they expose young laboratory rats to either a cell phone or other source of microwave radiation, and later they sacrifice the animals and look for albumin in their brain tissue. Albumin is a protein that is a normal component of blood but that does not normally cross the blood-brain barrier. The presence of albumin in brain tissue is always a sign that blood vessels have been damaged and that the brain has lost some of its protection.

Here is what these researchers have found, consistently for 18 years: Microwave radiation, at doses equal to a cell phone's emissions, causes albumin to be found in brain tissue. A one-time exposure to an ordinary cell phone for just two minutes causes albumin to leak into the brain. In one set of experiments, reducing the exposure level by a factor of 1,000 actually increased the damage to the blood-brain barrier, showing that this is not a dose-response effect and that reducing the power will not make wireless technology safer. And finally, in research published in June 2003, a single two-hour exposure to a cell phone, just once during its lifetime, permanently damaged the blood-brain barrier and, on autopsy 50 days later, was found to have damaged or destroyed up to 2 percent of an animal's brain cells, including cells in areas of the brain concerned with learning, memory and movement.¹ Reducing the exposure level by a factor of 10 or 100, thereby duplicating the effect of wearing a headset, moving a cell phone further from your body, or standing next to somebody else's phone, did not appreciably change the results! Even at the lowest exposure, half the animals had a moderate to high number of damaged neurons.

The implications for us? Two minutes on a cell phone disrupts the blood-brain barrier, two hours on a cell phone causes permanent brain damage, and secondhand radiation may be almost as bad. The blood-brain barrier is the same in a rat and a human being.

These results caused enough of a commotion in Europe that in November 2003 a conference was held, sponsored by the European Union, titled “The Blood-Brain Barrier — Can It Be Influenced by RF [radio frequency]-Field Interactions?” as if to reassure the

public: “See, we are doing something about this.” But, predictably, nothing was done about it, as nothing has been done about it for 30 years.

America’s Allan Frey, during the 1970s, was the first of many to demonstrate that low-level microwave radiation damages the blood-brain barrier.² Similar mechanisms protect the eye (the blood-vitreous barrier) and the fetus (the placental barrier), and the work of Frey and others indicates that microwave radiation damages those barriers also.³ The implication: No pregnant woman should ever be using a cell phone.

Dr. Salford is quite outspoken about his work. He has called the use of handheld cell phones “the largest human biological experiment ever.” And he has publicly warned that a whole generation of cell-phone-using teenagers may suffer from mental deficits or Alzheimer’s disease by the time they reach middle age.

Radio-Wave Sickness

Unfortunately, cell phone users are not the only ones being injured, nor should we be worried only about the brain. The following brief summary is distilled from a vast scientific literature on the effects of radio waves (a larger spectrum which includes microwaves), together with the experiences of scientists and doctors all over the world with whom I am in contact.

Organs that have been shown to be especially susceptible to radio waves include the lungs, nervous system, heart, eyes, testes and thyroid gland. Diseases that have increased remarkably in the last couple of decades, and that there is good reason to connect with the massive increase in radiation in our environment, include asthma, sleep disorders, anxiety disorders, attention deficit disorder, autism, multiple sclerosis, ALS, Alzheimer’s disease, epilepsy, fibromyalgia, chronic fatigue syndrome, cataracts, hypothyroidism, diabetes, malignant melanoma, testicular cancer, and heart attacks and strokes in young people. Radiation from microwave towers has also been associated with forest die-off, reproductive failure and population decline in many species of birds, and ill health and birth deformities in farm animals. The literature showing biological effects of microwave radiation is truly enormous, running to tens of thousands of documents, and I am amazed that industry spokespersons are getting away with saying that wireless technology has been proved safe or — just as ridiculous — that there is no evidence of harm.

I have omitted one disease from the above list: the illness that Caller B has, and that I have. A short history is in order here. In the 1950s and 1960s workers who built, tested and repaired radar equipment came down with this disease in large numbers. So did operators of industrial microwave heaters and sealers. The Soviets named it, appropriately, radio wave sickness, and studied it extensively. In the West its existence was denied totally, but workers came down with it anyway. Witness congressional hearings held in 1981, chaired by then Representative Al Gore, on the health effects of radio-frequency heaters and sealers, another episode in “See, we are doing something about this,” while nothing is done.

Today, with the mass proliferation of radio towers and personal transmitters, the disease has spread like a plague into the general population. Estimates of its prevalence range up to one-third of the population, but it is rarely recognized for what it is until it has so disabled a person that he or she can no longer participate in society. You may recognize some of its common symptoms: insomnia, dizziness, nausea, headaches, fatigue, memory loss, inability to concentrate, depression, chest discomfort, ringing in the ears. Patients may also develop medical problems such as chronic respiratory infections, heart arrhythmias, sudden fluctuations in blood pressure, uncontrolled blood sugar, dehydration, and even seizures and internal bleeding.

What makes this disease so difficult to accept, and even more difficult to cope with, is that no treatment is likely to succeed unless one can also avoid exposure to its cause — and its cause is now everywhere. A 1998 survey by the California Department of Health Services indicated that at that time 120,000 Californians — and by implication 1 million Americans — were unable to work due to electromagnetic pollution.⁴ The ranks of these so-called electrically sensitive are swelling in almost every country in the world, marginalized, stigmatized and ignored. With the level of radiation everywhere today, they almost never recover and sometimes take their own lives.

“They are acting as a warning for all of us,” says Dr. Olle Johansson of people with this illness. “It could be a major mistake to subject the entire world’s population to whole-body irradiation, 24 hours a day.” A neuroscientist at the famous Karolinska Institute in Stockholm, Dr. Johansson heads a research team that is documenting a significant and permanent worsening of the public health that began precisely when the second-generation, 1800 MHz cell phones were introduced into Sweden in late 1997.^{5,6} After a decade-long decline, the number of Swedish workers on sick leave began to rise in late 1997 and more than doubled during the next five years. During the same period of time, sales of antidepressant drugs also doubled. The number of traffic accidents, after declining for years, began to climb again in 1997. The number of deaths from Alzheimer’s disease, after declining for several years, rose sharply in 1999 and had nearly doubled by 2001. This two-year delay is understandable when one considers that Alzheimer’s disease requires some time to develop.

Uncontrolled Proliferation

If cell phones and cell towers are really deadly, have the radio and TV towers that we have been living with for a century been safe? In 2002 Örjan Hallberg and Olle Johansson coauthored a paper titled “Cancer Trends During the 20th Century,” which examined one aspect of that question.⁷ They found, in the United States, Sweden and dozens of other countries, that mortality rates for skin melanoma and for bladder, prostate, colon, breast and lung cancers closely paralleled the degree of public exposure to radio waves during the past hundred years. When radio broadcasting increased in a given location, so did those forms of cancer; when it decreased, so did those forms of cancer. And, a sensational finding: country by country — and county by county in Sweden — they found, statistically, that exposure to radio waves appears to be as big a factor in causing lung cancer as cigarette smoking!

Which brings me to address a widespread misconception. The biggest difference between the cell towers of today and the radio towers of the past is not their safety, but their numbers. The number of ordinary radio stations in the United States today is still less than 14,000. But cell towers and Wi-Fi towers number in the hundreds of thousands, and cell phones, wireless computers, cordless telephones and two-way radios number in the hundreds of millions. Radar facilities and emergency communication networks are also proliferating out of control. Since 1978, when the Environmental Protection Agency last surveyed the radio frequency environment in the United States, the average urban dweller's exposure to radio waves has increased 1,000-fold, most of this increase occurring in just the last nine years.⁸ In the same period of time, radio pollution has spread from the cities to rest like a ubiquitous fog over the entire planet.

The vast human consequences of all this are being ignored. Since the late 1990s a whole new class of environmental refugees has been created right here in the United States. We have more and more people, sick, dying, seeking relief from our suffering, leaving our homes and our livelihoods, living in cars, trailers and tents in remote places. Unlike victims of hurricanes and earthquakes, we are not the subject of any relief efforts. No one is donating money to help us, to buy us a protected refuge; no one is volunteering to forego their cell phones, their wireless computers and their cordless phones so that we can once more be their neighbors and live among them.

The worried and the sick have not yet opened their hearts to each other, but they are asking questions. To answer caller A: No shield or headset will protect you from your cell or portable phone. There is no safe distance from a cell tower. If your cell phone or your wireless computer works where you live, you are being irradiated 24 hours a day.

To caller B: To effectively shield a house is difficult and rarely successful. There are only a few doctors in the United States attempting to treat radio wave sickness, and their success rate is poor — because there are few places left on Earth where one can go to escape this radiation and recover.

Yes, radiation comes down from satellites, too; they are part of the problem, not the solution. There is simply no way to make wireless technology safe.

Our society has become both socially and economically dependent, in just one short decade, upon a technology that is doing tremendous damage to the fabric of our world. The more entrenched we let ourselves become in it, the more difficult it will become to change our course. The time to extricate ourselves, both individually and collectively — difficult though it is already is — is now.

NOTES

1. Leif G. Salford et al., "[Nerve Cell Damage in Mammalian Brain After Exposure to Microwaves from GSM Mobile Phones](#)," *Environmental Health Perspectives* 111, no. 7 (2003): 881–883.
2. Allan H. Frey, Sondra R. Feld and Barbara Frey, "Neural Function and Behavior," *Annals of the New York Academy of Sciences* 247 (1975): 433–439.
3. Allan H. Frey, "Evolution and Results of Biological Research with Low-Intensity Nonionizing Radiation," in *Modern Bioelectricity*, ed. Andrew A. Marino (New York: Dekker, 1988), 785–837, at 809–810.
4. California EMF Program, [The Risk Evaluation: An Evaluation of the Possible Risks From Electric and Magnetic Fields \(EMFs\) From Power Lines, Internal Wiring, Electrical Occupations and Appliances](#) (2002), app. 3.
5. Örjan Hallberg and Olle Johansson, "1997 — A Curious Year in Sweden," *European Journal of Cancer Prevention* 13, no. 6 (2004): 535–538.
6. Örjan Hallberg and Olle Johansson, "Does GSM 1800 MHz Affect the Public Health in Sweden?" in *Proceedings of the 3rd International Workshop "Biological Effects of EMFs"*, Kos, Greece, October 4-8, 2004, 361–364.
7. Örjan Hallberg and Olle Johansson, "Cancer Trends During the 20th Century," *Journal of Australian College of Nutritional and Environmental Medicine* 21, no. 1 (2002): 3–8.
8. David E. Janes Jr., "Radiofrequency Environments in the United States," in *15th IEEE Conference on Communication*, Boston, MA, June 10–14, 1979, vol. 2, 31.4.1–31.4.5.