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Health Effects of Microwave Radiation (Western View)

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[T]he public is now understandably wary of safety assurances from “official” government scientific sources w.r.t. [with regard to] electromagnetic pollution. This skepticism is enhanced when views contrary to official perceived wisdom is [sic], at worst silenced or, at best, studiously ignored.

[March 2001 report by the European Parliament STOA](#)

We’re all participating in a giant experiment in involuntary epidemiology—irradiated by cell phones and towers, cordless phones, satellites, broadcast antennas, military and aviation radar, TVs, computers, wireless internet, wireless LANs in schools and the workplace, and now these meters, waiting to see what it does to us.

Actually, we know what it does to us, so the results shouldn’t come as any surprise.

The main problem isn’t cancer, although the industry would like you to believe that, because then they can pull out statistics showing how infrequently it occurs as a result of low-level radiation. Cancer takes a long time to develop. Typically, other problems show up first: neurological, reproductive, and cardiac. Problems with severe headaches, sleep disturbances, memory loss, learning disabilities, attention deficit disorder, and infertility show up long before cancer. When cancer does appear, it’s typically brain tumors, leukemia, and lymphoma.

Here are a few things to keep in mind about the health effects of microwave radiation:

1. Effects at low levels can be more noticeable than at higher levels.

The existence of a “window effect” is well documented, in which effects occur at certain frequencies and power densities but not at those immediately above or below them. However, it’s not as simple as just mapping these frequencies and power levels, because the local geomagnetic field and individual susceptibility also influence the

result.

Following are a few examples of the nonlinear nature of the effects, from Arthur Firstenberg's book *Microwaving Our Planet* (see bottom of page for information). In each case, emphasis has been added:

Firstenberg points out (p. 41) that "calcium ion efflux from brain tissue is extremely sensitive to irradiation with radiofrequency waves." He cites four studies and a literature review. In particular, a 1986 study by Dutta et al. at 915 MHz and various exposure levels showed that "The effect at 0.0007 mW/g SAR [specific absorption rate] was quadruple the effect at 2.0 mW/g, **in other words 3000 times the intensity had 4 times less of an effect under these particular conditions.**" Looking at it the other way, **an intensity three thousand times lower had an effect four times greater.**

Firstenberg describes a number of studies on microwave radiation and blood cells. In one, "Chiang et al. (1989) in their epidemiological study found that **white blood cell phagocytosis was stimulated by chronic exposure to the lowest intensities of radio waves and inhibited, sometimes severely, by higher intensities.** . . . Exposure levels ranged from 0–4 mW/cm² to 120 mW/cm²." (p. 22)

In another study on blood, "These results were further refined by a 30-day experiment with guinea pigs at 1, 5, 10, and 50 mW/cm² (Shandala and Vinogradov 1978). All these intensities increased complement in the blood and stimulated phagocytosis by neutrophils, but **1 mW/cm² had the biggest effect, and 50 mW/cm² the smallest effect.**" (p. 23)

The September 2000 newsletter of the Cellular Phone Taskforce, *No Place To Hide*, reported on some studies presented at the June 2000 European Parliament meeting on mobile phones and health. In one presentation, Dr. Lebrecht von Klitzing, of the Medical University of Lubeck, Germany, said, "**Some people become ill at power densities of less than 10 nanowatts/cm². . . . Small children are very sensitive to these emitters, down to field densities of 1 nanowatt/cm².**"

Another article in the newsletter says that Dr. Leif Salford, of Lund University, Sweden, "had previously reported that short exposure to microwaves at 915 MHz damages the blood-brain barrier. . . . 'The most remarkable observation in our studies,' said Salford [at the conference], 'is the fact that SAR values lower than 1 mW/kg give rise to a more pronounced albumin leakage than higher SAR values. . . . **The situation that the weakest fields, according to our findings, are the biologically most effective, poses a major problem.**' "

2. Another effect independent of power level is resonance, which occurs at certain frequency ranges where the wavelength is near the size of a body part. An example is the 900 Mhz range, which has a

wavelength of approximately one foot—a size that can cause resonance in a child's head (because some of the radiation is absorbed, and the wavelength decreases). This intensifies the biological effect. Also, children's skulls are thinner, so microwaves penetrate more easily. (Another problem is that children's cells are dividing rapidly, which creates more chance for DNA damage. Their immune systems are not fully developed and can't defend them against this.)

3. Pulsed radiation, used for some microwave signals, is more harmful at the cellular level than continuous-wave.

4. Studies are typically done for short exposure periods at higher intensities, because running studies longer costs more money. This allows the industry to claim that few studies have been done that show effects for long-term, low-level exposure and that “nonthermal” effects do not exist. But public health scientists point out that duration is also important, and long-term, low-level exposure can have equivalent effects.

5. The effects of radiation are cumulative, in both senses. The meters add to the cumulative radiation as sources proliferate, and microwave radiation is cumulative in sense of increasing the body's sensitivity over time. Research shows that test subjects don't always recover completely and that subsequent exposures can cause effects at lower levels.

6. There are no longer any control groups, because we are now exposed to so much radiation. Alasdair Phillips points out the problem in an email to the Roy Beavers list (archived on the Library page at www.wave-guide.org),

Recently an American epidemiologist, Dr Sam Milham, re-analysed Doll's own data presented in his 1956 (Doll & Hill) paper which showed that heavy smokers were 23.7 times more likely to die from lung cancer than non-smokers. However when you compare the figures for heavy smokers vs light and moderate ones the ORs [odds ratios] fall to 3.5 and 1.9. When you compare light smokers with moderate ones you get an OR of only 1.8.

Applying this concept to microwaves, there are no unexposed and few highly exposed subjects. So experimental results showing harm compared to a control group can be deceptively low—like comparing lung cancer in heavy smokers to light or moderate smokers rather than nonsmokers. This allows the industry to downplay the implications of health effects.

7. Even in full studies, sometimes the abstract and/or conclusion may not accurately reflect the study's data, especially if the industry was involved or the researcher is concerned about funding.

For example, Kathleen Thurmond, M.D., in a 1999 talk, said,

A study presented by Dr. Ross Adey at the 1996 annual meeting of the Bioelectromagnetics Society in Victoria, B.C., Canada, showed a decrease in the incidence of brain tumors in rats chronically exposed to digital cellular telephone fields. However, there was no mention in his study of the increased incidence of spinal column tumors found in his research according to a reliable source. It would be standard scientific practice to at least note this finding regarding spinal column tumors. Dr. Ross Adey's research funding by Motorola has now been terminated.

Dr. Henry Lai was quoted in the London *Times* as saying, "They are asking me to change my whole interpretation of the findings in a way that would make them more favorable to the mobile phone industry. This is what happened in the tobacco industry. They had data in their hands but when it was not favorable they did not want to disclose it."

The [European Parliament report](#) says, "[A] relatively recent reanalysis of the Lilienfeld report on the Moscow US Embassy irradiation during the 'cold' war, based on information that only became fully available following the Freedom of Information Act . . . reveals that the original verdict of no serious health effects was, in fact, a sanitised version of Lilienfeld's findings, in which his statements of concern had been deliberately removed by the State Department."

Sources

Alternatives to reading every study include abstracts, books or reports that summarize the research, and capsule descriptions of studies in tabular format. Following are some sources for each of these:

Abstracts

Dr. Henry Lai, a well-known bioelectromagnetics researcher at the University of Washington, Seattle, has compiled a 97-page collection of abstracts from studies conducted between 1995 and 2000. The list, in pdf format, can be found on the Research page of the EMR Network's web site. As the web site points out, "80% of these studies demonstrate some kind of biological effect."

Reports

The Physiological and Environmental Effects of Non-Ionising Electromagnetic Radiation is a 34-page [report issued in March 2001 by the European Parliament](#) Directorate General for Research, Scientific and Technological Options Assessment (STOA). Written by Dr. Gerard Hyland, it pulls no punches in warning of the hazards of microwave radiation.

Potential and Actual Adverse Effects of Radiofrequency and Microwave Radiation at Levels Near and Below 2 uW/cm², is a 200-

page report by Dr. Neil Cherry, of Lincoln University, New Zealand. The introduction says, "Strong claims by industry representatives and their consultants that there is no scientific evidence to justify the public's fears is scientifically demonstrably wrong."

An April 2001 [press release by the ECOLOG-Institut](#), in Hannover, Germany, says that the institute's report on cellular microwave exposure presents "the results and recommendations of the comprehensive study carried out by order of the German T-Mobil, in which physicists, medical scientists, and biologists took part." (The press release and study are available in German on the Institute's web site.)

There are a number of scientific findings from investigations on sub-populations with an elevated exposition to high frequency electromagnetic fields and from animal experiments that have to be taken seriously. These findings point on a cancer-promoting effect of high frequency electromagnetic fields used by cellular telephone technology. Experiments on cell cultures yielded clear evidence for geno-toxic effects of these fields, like DNA breaks and damage to chromosomes, so that even a cancer-initiating effect cannot be excluded any longer. The findings that high frequency electro-magnetic fields influence cell transformation, cell promotion and cell communication also point on a carcinogenic potential of the fields used for cellular telephony. Moreover disturbances of other cellular processes, like the synthesis of proteins and the control of cell functions by enzymes, have been demonstrated.

In numerous experiments on humans as on animals influences on the central nervous system were proven, which reach from neuro-chemical effects to modifications of the brain potentials and impairments of certain brain functions. The latter effects for instance have been demonstrated by animal experiments and e.g. showed up as deficits in the ability to learn simple tasks when exposed to the fields. From experiments with volunteers, who were exposed to the fields of mobile telephones, there is clear evidence for influences on certain cognitive functions. Possible risks for the brain also arise from an increased permeability of the blood-brain barrier to potentially harmful substances, observed in several experiments on animals exposed to mobile telephone fields.

The scientist at the ECOLOG-Institute also found some evidence for disturbances of the hormone and the immune system. High frequency electromagnetic fields cause stress reactions, showing up in an increased production of stress hormones in experimental animals and they lead to a reduction of the concentration of the hormone melatonin in the blood of exposed animals. The latter finding is important, because melatonin has a central control function for the

hormone system and the diurnal biological rhythms and it is able to retard the development of certain tumours.

Dr. Peter Neitzke, coordinator of the institute's working group, says this:

80 per cent of the papers published in scientific journals do not contribute anything to the evaluation of possible health risks due to the electromagnetic fields emitted by cellular telephones and their base stations. The remainder however, on which our assessment relies, *is made so good and is in itself so consistent that we must take the findings referring to health risks seriously. In order to improve the protection of the public against the possibly harmful effects of the electromagnetic fields from cellular telephones and their base stations, we need much lower precautionary standards. . . .* [Italics added.]

The report says, "The ECOLOG-institute recommends not to exceed a precautionary standard of 0,01 W/m² [= 1 microwatt per square centimeter] when siting cellular telephone base stations in the proximity of dwellings, schools, kindergartens, hospitals, and similarly sensitive uses."

In a commentary to this, Dr. Neil Cherry, a well-known EMF researcher in New Zealand, says, "The actual expose levels at which these genetic effects are shown are about 0.5 to 1.2 microWatt/sq cm. These are not safe levels, they are just experimental levels that show that at extremely low experimental levels genotoxic response occur—cell-by-cell. There is no safe threshold."

In other words, the maximum level the ECOLOG-Institute recommends is already the level at which, as Dr. Cherry points out, genetic effects occur. This also happens to be about the same exposure level from a cell-phone tower with a single set of antennas, sometimes as much as 1000 feet away or more, depending on terrain, obstructions, signal strength, etc. When another telecom with the same signal strength colocates on the tower, the radiation increases.

Capsule Descriptions

A list of about two dozen studies on low-level microwaves, compiled by Cindy Sage, a consultant on EMF mitigation, can be found on the Library page at www.wave-guide.org. The list is grouped by exposure level (from .1 to 120 mW/cm²) and SAR (Specific Absorption Rate).

As part of his [Radio Wave Packet](#), Arthur Firstenberg, president of the Cellular Phone Taskforce, has created a list of about 40 studies grouped by exposure level, beginning as low as 10⁻¹³ mW/cm² and extending to 10 mW/cm². Therefore, it has little overlap with Cindy Sage's list and is more applicable to the levels encountered with microwave meters and cell towers. It also includes Soviet and Russian

research.

Books

Arthur Firstenberg has also written a book, *Microwaving Our Planet* (currently out of print), with brief descriptions of studies grouped by the affected system (nervous, reproductive, heart, respiratory, etc.) and, under each system, by whether the study was done on humans, animals, or cells.