A Cellular Phone Tower on Ossining High School?

The Ossining School Board voted to allow placement of a PCS Base Station atop the Ossining High School on the basis of a "Safety Analysis" which claimed to report the health effects of the radiation emitted from such antennas.(1) Instead, it suppressed current areas of controversy and uncertainty and claimed falsely that this technology is, in effect, universally considered safe.

Critical questions concerning the health effects and safety of **radiofrequency electromagnetic radiation (RF)** remain! ***Should we expose our children and ourselves to this radiation for the next twenty years when so much uncertainty exists?***

Our School Board was told that concerns about health effects from exposure to magnetic fields from electric power distribution lines or the use of hand held cell phones are based on fear, not fact. The Board was not told that a National Institute of Environmental Health Sciences panel this year designated power frequency electromagnetic fields (EMF) as "possible human carcinogens."(2)

There is a robust and ongoing controversy over many aspects of RF health effects. While no one disagrees that serious health hazards occur when living cells in the body are heated, as happens with high intensity RF exposure (just like in a microwave oven), scientists are currently still investigating the health hazards of low intensity exposure. Low intensity exposure is exposure which does not raise the temperature of the living cells in the body.

The telecommunications industry claims cellular antennas are safe because the radiation they produce is too weak to cause heating, a "thermal effect." They point to "safety standards" from groups such as ANSI/IEEE or ICNIRP to support their claims. But these groups have explicitly stated that their claims of "safe levels of exposure" are based on thermal levels.(3) Thus the claim that the RF exposure is harmless rests on the fact that it is too weak to produce a rise in temperature, a "thermal effect."

There is a large body of internationally accepted scientific evidence which points to the existence of nonthermal effects of microwave radiation. The issue at the present time is not whether such evidence exists, but rather what weight to give it.

Internationally acknowledged experts in the field of RF research have shown that RF of the type used in digital cellular antennas and phones can have critical effects on cell cultures, animals, and people in laboratories and have also found epidemiological evidence (studies of communities, not in the laboratory) of serious health effects at "non-thermal levels," where the intensity of the radiation was too low to cause heating. They have found:

- Increased cell growth of brain cancer cells(4)

- A doubling of the rate of lymphoma in mice(5)
- Changes in tumor growth in rats(6)
- An increased number of tumors in rats(7)
- Increased breaks in double and single stranded DNA, our genetic material(8)
- 2 to 4 times as many cancers in Polish soldiers exposed to RF(9)
- More childhood leukemia in children exposed to RF(10)
- Changes in sleep patterns and REM type sleep(11)
- Headaches caused by RF exposure(12)
- Neurologic changes(13) including
    - Changes in the blood-brain-barrier(14)
    - Changes in cellular morphology (including cell death)(15)
    - Changes in neural electrophysiology (EEG)(16)
    - Changes in neurotransmitters (which affect motivation and pain perception)(17)
    - Metabolic changes (of calcium ions, for instance)(18)
    - Cytogenetic effects (which can affect cancer, Alzheimer's, neurodegenerative diseases)(19)
- Decreased memory, attention, and slower reaction time in school children(20)
- Retarded learning in rats indicating a deficit in spatial "working memory"(21)
- Increased blood pressure in healthy men(22)
- Damage to eye cells when combined with commonly used glaucoma medications(23)

Many national and international organizations have recognized the need to define the true risk of low intensity, non-thermal RF exposure, calling for intensive scientific investigation to answer the open questions. These include:

- The World Health Organization, noting reports of "cancer, reduced fertility, memory loss, and adverse changes in the behavior and development of children."(24)
- The U. S. Food and Drug Administration (FDA)(25)
- The International Agency for Research on Cancer (IARC)(26)
- The Swedish Work Environmental Fund(27)
- The National Cancer Institute (NCI)(28)
- The European Commission (EC)(29)
- New Zealand's Ministry of Health(30)
- National Health and Medical Research Council of Australia(31)
- Commonwealth Scientific Industrial Research Organization of Australia (CSIRO)(32)

Non-thermal effects are recognized by experts on RF and health to be potential health hazards. Safe levels of

RF exposure for these low intensity, non-thermal effects have not yet been established.

The FDA has explicitly rejected claims that cellular phones are "safe."(33)

The Environmental Protection Agency (EPA) has rejected the current (ANSI/IEEE) safety standards because they are based on thermal effects alone.(34)

Many scientists and physicians question the safety of exposure to RF. The CSIRO study, for example, notes that there are no clear cutoff levels at which low intensity exposure has no effect, and that the results of ongoing studies will take years to analyze.(35)

The county of Palm Beach, FL, the state of California, and the country of New Zealand have all prohibited cellular antennas near schools due to safety concerns.

What should we do while waiting for the much needed answers about the non-thermal effects of RF? This is the question we, as parents, students, and Ossining residents must answer.

The Board of Education has the responsibility of protecting and promoting the best interests of the students of our schools and of our community in general. The commercial interests of outside profit-making corporations can play no role in their decisions.

We simply don't know at this time what the possible health consequences of long term, low level exposure to RF of the type used by the PCS Base Station antenna will be. No one knows--the data just isn't there. The chairman of the ICNIRP, one of the main groups which formulated the current exposure guidelines, has stated that the guidelines include "no consideration regarding prudent avoidance" for health effects for which evidence is less than conclusive.(36)

Should we allow ourselves to take this risk?

Should we allow our children to take this risk?

School buildings, youth centers, and other places where children are found are not the proper place for a technology which could endanger health and well being.

As noted at the start of this brief review, our School Board was told none of this when they were asked to decide on the siting of the cellular phone antenna. The "Safety Analysis" they received was not an honest attempt to explain the health effects of RF exposure, but rather a sophisticated "sale's pitch" designed to blind the Board to the real questions and uncertainties. While such behavior in an attempt to "make a sale" can never be condoned, in the case of the suppression of information about possible adverse health consequences

for the children of our schools, it is unconscionable. Our children and their parents stand defenseless before such a strategy.

The only reasonable and responsible course is to "play it safe" with our children. The Ossining High School is not the proper place for a cellular telephone antenna.

[back] 1. "Safety Analysis of the Electromagnetic Environment in the Vicinity of a Proposed Personal Communications Services Base Station, Site 06-460I: Ossining High School, Ossining, New York" prepared by the Wireless & Optical Technologies Safety Department of Bell Laboratories for Sprint Spectrum L.P.

[back] 2. An international blue ribbon panel assembled by the National Institute of Environmental Health Sciences (NIEHS) designated power frequency electromagnetic fields (EMF) as "possible human carcinogens" on June 24, 1998. The panel's decision was based largely on the results of epidemiological studies of children exposed at home and workers exposed on the job. The evaluation of the EMF literature followed procedures developed by the International Agency for Research on Cancer (IARC), based in Lyon, France. The working group's report will be the basis for the NIEHS report to Congress on the EMF Research and Public Information Dissemination program (EMF RAPID). The National Radiological Protection Board (NRPB) of the United Kingdom noted that the views of its Advisory Group on Non-Ionizing Radiation are "consistent with those of the NIEHS expert panel."

June 26, 1998 statement of the National Radiological Protection Board, sited in Microwave News, July/August 1998

[back] 3. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) statement "Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters" of 1996 reads:

"Thermally mediated effects of RF fields have been studied in animals, including primates. These data suggest effects that will probably occur in humans subjected to whole body or localized heating sufficient to increase tissue temperatures by greater than 1C. They include the induction of opacities of the lens of the eye, possible effects on development and male fertility, various physiological and thermoregulatory responses to heat, and a decreased ability to perform mental tasks as body temperature increases. Similar effects have been reported in people subject to heat stress, for example while working in hot environments or by fever. The various effects are well established and form the biological basis for restricting occupational and public exposure to radiofrequency fields. In contrast, non-thermal effects are not well established and currently do not form a scientifically acceptable basis for restricting human exposure for frequencies used by hand-held radiotelephones and base stations."

International Commission on Non-Ionizing Radiation Protection, "Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters," Health Physics 70:587-593, 1996

The ANSI/IEEE Standard for Safety Levels of 1992 similarly states:

"An extensive review of the literature revealed once again that the most sensitive measurements of potentially harmful biological effects were based on the disruption of ongoing behavior associated with an increase of body temperature in the presence of electromagnetic fields. Because of the paucity of reliable data on chronic exposures, IEEE Subcommittee IV focused on evidence of behavioral disruption under acute exposures, even disruption of a transient and fully reversible nature."

IEEE Standards Coordinating committee 28 on Non-Ionizing Radiation Hazards: Standard for Safe Levels

With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz (ANSI/IEEE C95.1-1991), The Institute of Electrical and Electronics Engineers, New York, 1992

[back] 4. Drs. Czerska, Casamento, Ning, and Davis (working for the Food and Drug Administration in 1997) using "a waveform identical to that used in digital cellular phones" at a power level within our current standards (SAR of 1.6 W/Kg, the maximum spatial peak exposure level recommended for the general population in the ANSI C95.1-1991 standard) found increases in cellular proliferation in human glioblastoma cells. This shows that "acceptable" levels of radiation can cause human cancer cells to multiply faster. The authors note that "because of reported associations between cellular phone exposure and the occurrence of a brain tumor, glioblastoma, a human glioblastoma cell line was used" in their research.

E.M. Czerska, J. Casamento, J. T. Ning, and C. Davis, "Effects of Radiofrequency Electromagnetic Radiation on Cell Proliferation," [Abstract presented on February 7, 1997 at the workshop 'Physical Characteristics and Possible Biological Effects of Microwaves Applied in Wireless Communication, Rockville, MD] E. M. Czerska, J. Casamento Centers for Devices and Radiological Health, Food and Drug Administration, Rockville, Maryland 20857, USA; H. T. Ning, Indian Health Service, Rockville, Maryland 20857, USA; C. Davis, Electrical Engineering Dept., Univ. of Maryland, College Park, Maryland 20742, USA

[back] 5. Dr. Michael Repacholi (in 1997, currently the director of the International Electromagnetic Fields Project at the World Health Organization) took one hundred transgenic mice and exposed some to radiation for two 30 minute periods a day for up to 18 months. He found that the exposed mice developed lymphomas (a type of cancer) at twice the rate of the unexposed mice. While telecommunications industry spokespersons criticized the experiment for using mice with a mutation which predisposed them to cancer (transgenic) the researchers pointed out that "some individuals inherit mutations in other genes...that predispose them to develop cancer, and these individuals may comprise a subpopulation at special risk from agents that would pose an otherwise insignificant risk of cancer."

Dr. Repacholi stated "I believe this is the first animal study showing a true nonthermal effect." He repeated the experiment in 1998 using 50 Hz fields instead of the 900 MHz pulsed radiation (the type used by cellular phones) used in the original experiment and found no cancer risk. He stated that this new data had implications for his original cellular phone study: "the control groups for both our RF and 50 Hz field studies showed no statistical differences, which lessens the possibility that the RF study result was a chance event or due to errors in methodology."

It is extremely important to note that Dr. Michael Repacholi was Chairman of the ICNIRP at the time its Statement on Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters was developed in 1996.

M. Repacholi et al., "Lymphomas in Eμ-Pim1 Transgenic Mice Exposed to Pulsed 900 MHz Electromagnetic Fields," Radiation Research, 147, pp.631-640, May 1997

[back] 6. Dr. Ross Adey (Veterans Administration Hospital in 1996) found what appeared to be a protective effect in rats exposed to the type of radiation used in digital cellular phones. The rats were exposed to an SAR of 0.58-0.75 W/Kg 836 MHz pulsed radiation of the TDMA type two hours a day, four days a week for 23 months, with the signals turned on and off every 7.5 minutes, so total exposure was 4 hours a week. Interestingly this effect was not present when a non-digital, analog signal was used. Rats exposed developed cancer less often. This study shows that low power fields of the digital cellular frequency can influence cancer development. Whether they would protect or promote in our children is a question for further study.

Ross Adey of the Veterans Administration Hospital of Loma Linda, CA presented the results of pulsed (digital cellular) radiation on June 13, 1996 at the 18th Annual Meeting of the Bioelectromagnetics Society in Victoria, Canada. He presented the findings of the analog cellular phone radiation effect at the June 1997

2nd World Congress for Electricity and Magnetism in Biology and Medicine in Bologna, Italy. Reviews can be found in Microwave News issues July/August, 1996 and March/April 1997.

[back] 7. Dr. A. W. Guy reported an extensive investigation on rats chronically exposed from 2 up to 27 months of age to low-level pulsed microwaves at SARs up to 0.4 W/Kg. The exposed group was found to have a significantly higher incidence of primary cancers.

A. W. Guy, C. K. Chou, L. Kunz, L, Crowley, and J. Krupp, "Effects of Long-Term Low-Level Radiofrequency Radiation Exposure on Rats." Volume 9. Summary. Brooks Air Force Base, Texas, USAF School of Aerospace Medicine, USF-SAM-TR-85-11; 1985

[back] 8. Drs. Henry Lai and N. P. Singh of the University of Washington in Seattle have reported breaks in both single stranded and double stranded DNA in the brains of rats exposed to radiofrequency electromagnetic radiation at an SAR of 1.2 W/Kg. DNA is the carrier of the genetic information in all living cells. Cumulated DNA strand breaks in brain cells can lead to cancer or neurodegenerative diseases.

H. Lai and N. P. Singh, "Single- and Double-Strand DNA Breaks in Rat Brain Cells After Acute Exposure to Radiofrequency Electromagnetic Radiation," International Journal of Radiation Biology, Vol 69, No. 4, 513-521, 1996

[back] 9. Dr. Stanislaw Szmigielski has studied many thousands of Polish soldiers. He has found that those exposed to radiofrequency and microwave radiation had more than double the cancer rate of the unexposed servicemen analyzing data from 1971-1985. He has presented further data suggesting a dose-response relationship with soldiers exposed to 100-200 W/cm^2 suffering 1.69 times as many cancers as the unexposed, and those exposed to 600-1000 W/cm^2 suffering 4.63 times as many cancers. 1000 W/cm^2 is the level considered safe for the public according to FCC regulations. Occupational exposure up to 5000 W/cm^2 is allowed.

S. Szmigielski, "Cancer Morbidity in Subjects Occupationally Exposed to High Frequency (Radiofrequency and Microwave) Electromagnetic Radiation," The Science of the Total Environment 180:9-17, 1996

[back] 10. Dr. Bruce Hocking found an association between increased childhood leukemia incidence and mortality in the proximity of television towers. The power density ranged from 0.2-8.0 W/cm^2 nearer and 0.02 W/cm^2 farther from the towers.

B. Hocking, I. R. Gordon, H. L. Grain, and G. E. Hatfield, "Cancer Incidence and Mortality and Proximity to TV Towers," Medical Journal of Australia 165: 601-605; 1996

[back] 11. Drs. Mann and Röschke investigated the influence of pulsed high-frequency electromagnetic fields of digital mobile radio telephones on sleep in healthy humans. They found a hypnotic effect with shortening of sleep onset latency and a REM (Rapid Eye Movement) suppressive effect with reduction of duration and percentage of REM sleep. "REM sleep plays a special physiological role for information processing in the brain, especially concerning consolidation of new experiences. Thus the effects observed possibly could be associated with alterations of memory and learning functions."

K. Mann and J. Röschke, "Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep," Neuropsychobiology 33:41-47, 1996

[back] 12. Dr. Allen Frey has been researching microwave radiation for over 3 decades. Here is the abstract on a paper concerning headaches and cellular phone radiation. "There have been numerous recent reports of headaches occurring in association with the use of hand-held cellular telephones. Are these reported

headaches real? Are they due to emissions from telephones? There is reason to believe that the answer is "yes" to both questions. There are several lines of evidence to support this conclusion. First, headaches as a consequence of exposure to low intensity microwaves were reported in the literature 30 years ago. These were observed during the course of microwave hearing research before there were cellular telephones. Second, the blood-brain barrier appears to be involved in headaches, and low intensity microwave energy exposure affects the barrier. Third, the dopamine-opiate systems of the brain appear to be involved in headaches, and low intensity electromagnetic energy exposure affects those systems. In all three lines of research, the microwave energy used was approximately the same--in frequencies, modulations, and incident energies--as those emitted by present day cellular telephones, Could the current reports of headaches be the canary in the coal mine, warning of biologically significant effects?"

A. H. Frey, "Headaches from Cellular Telephones: Are they Real and What Are the Implications?" Environmental Health Perspectives Vol 106, Num. 3, pp.101-103, March 1998

[back] 13. Henry Lai's review of the literature concerning neurological effects of RF: Existing data indicate that RF of relatively low intensity can affect the nervous system. Changes in blood-brain barrier, morphology, electrophysiology, neurotransmitter functions, cellular metabolism, and calcium efflux, and genetic effects have been reported in the brain of animals after exposure to RF. These changes can lead to functional changes in the nervous system. Behavioral changes in animals after exposure to RR have been reported.

Even a temporary change in neural functions after RF exposure could lead to adverse consequences. For example, a transient loss of memory function or concentration could result in an accident when a person is driving. Loss of short term working memory has indeed been observed in rats after acute exposure to RF.

Research has also shown that the effects of RF on the nervous system can cumulate with repeated exposure. The important question is, after repeated exposure, will the nervous system adapt to the perturbation and when will homeostasis break down? Related to this is that various lines of evidence suggest that responses of the central nervous system to RF could be a stress response. Stress effects are well known to cumulate over time and involve first adaptation and then an eventual break down of homeostatic processes.

H. Lai, "Neurological Effects of Radiofrequency Electromagnetic Radiation Relating to Wireless Communication Technology," Paper presentation at the IBC-UK Conference: "Mobile Phones-Is There a Health Risk?" September 16-17, 1997, Brussels, Belgium

[back] 14. Blood-Brain-Barrier: The blood-brain-barrier (BBB) is primarily a continuous layer of cells lining the blood vessels of the brain. It is critical for regulation of the brain's activity. Lai notes that "Even though most studies indicate that changes in the BBB occurs only after exposure to RF of high intensities with significant increase in tissue temperature, several studies have reported increases in permeability after exposure to RF of relatively low intensities....Pulsed RF seems to be more potent than continuous wave RF." Pulsed RF is the type used in digital cellular systems. Effects on the BBB were noted at the 0.2 W/cm^2 level, and even at SAR of 0.016-5 W/Kg. These effects could lead to local changes in brain function.

H. Lai, Ibid

[back] 15. Cellular Morphology: RF induced morphological changes of the central nervous system are shown only to occur under relatively high intensity or prolonged exposure to the radiation. However, there are several studies which show that *repeated* exposure at relatively low power intensities caused morphological changes in the central nervous system. Again here pulsed (as in digital phone use) RF produced more pronounced effects. Certain drugs given to nonhuman primates sensitized them, for instance allowing eye damage to occur at very low power intensities. Dr Lai notes "Changes in morphology, especially cell death, could have an important implication on health. Injury-induced cell proliferation has been hypothesized as a

cause of cancer." Some of these experiments were in the range of SAR 0.53 W/Kg or even 0.26 W/Kg.

H. Lai, Ibid

[back] 16. Neural Electrophysiology: Changes in neuronal electrophysiology, evoked potentials, and EEG have been reported. Some effects were observed at low intensities and after repeated exposure, suggesting cumulative effect. Energy density levels were as low as 50 W/cm^2.

H. Lai, Ibid

[back] 17. Neurotransmitters: Neurotransmitters are molecules which transmit information from one nerve cell to another. Early studies have reported changes in various neurotransmitters (catecholamines, serotonin, and acetylcholine) in the brain of animals only after exposure to high intensities of RF. However, there are more recent studies that show changes in neurotransmitter functions after exposure to low intensities of RF. For example, effects were seen at 50 W/cm^2 in one experiment.

RF activates endogenous opioids in the brain. Endogenous opioids are neurotransmitters with morphine-like properties and are involved in many important physiological and behavioral functions, such as pain perception and motivation.

The response to RF depends on the area of the brain studied and on the duration of exposure. Exposure to RF has been shown to affect the behavioral actions of benzodiazepines (these are drugs such as Valium).

H. Lai, Ibid

[back] 18. Metabolic Changes in Neural Tissue: Several studies investigated the effects of RF exposure on energy metabolism in the rat brain. Surprisingly, changes were reported after exposure to relatively low intensity RF for a short duration of time (minutes). The effects depended on the frequency and modulation characteristics of the RF and did not seem to be related to temperature changes in the tissue.

Calcium ions play important roles in the functions of the nervous system, such as the release of neurotransmitters and the actions of some neurotransmitter receptors. Thus changes in calcium ion concentration could lead to alterations in neural functions. This is an area of considerable controversy because some researchers have also reported no significant effects of RF exposure on calcium efflux. However, when positive effects were observed, they occurred after exposure to RF of relatively low intensities and were dependent on the modulation and intensity of the RF studied (window effects). Some studies had SARs as low as 0.05-0.005 W/Kg.

H. Lai, Ibid

[back] 19. Cytogenetic effects: Cytogenetic effects have been reported in various types of cells after exposure to RF. Recently, several studies have reported cytogenetic changes in brain cells by RF, and these results could have important implication for the health effects of RF. Genetic damage to glial cells can result in carcinogenesis. However, since neurons do not undergo mitosis, a more likely consequence of neuronal genetic damage is changes in functions and cell death, which could either lead to or accelerate the development of neurodegenerative diseases. Power densities of 1 mW/cm^2 were employed, a level considered safe for the public by the FCC.

RF-induced increases in single and double strand DNA breaks in rats can be blocked by treating the rats with melatonin or the spin-trap compound N-t-butyl--phenylnitrone. Since both compounds are potent free radical scavengers, these data suggest that free radicals may play a role in the genetic effect of RF. If free radicals are involved in the RF-induced DNA strand breaks in brain cells, results from this study could have an

important implication on the health effects of RF exposure. Involvement of free radicals in human diseases, such as cancer and atherosclerosis, have been suggested. Free radicals also play an important role in the aging process, which has been ascribed to be a consequence of accumulated oxidative damage to body tissues, and involvement of free radicals in neurodegenerative diseases, such as Alzheimer's, Huntington, and Parkinson, has also been suggested. One can also speculate that some individuals may be more susceptible to the effects of RF exposure.

H. Lai, Ibid

[back] 20. Dr. A. A. Kolodynski and V. V. Kolodynska of the Institute of Biology, Latvian Academy of Sciences, presented the results of experiments on school children living in the area of the Skrunda Radio Location Station in Latvia. Motor function, memory, and attention significantly differed between the exposed and control groups. The children living in front of the station had less developed memory and attention and their reaction time was slower.

A. A. Kolodynski, V. V. Kolodynska, "Motor and Psychological Functions of School Children Living in the Area of the Skrunda Radio Location Station in Latvia," The Science of the Total Environment 180:87-93, 1996

[back] 21. Dr. H. Lai and colleagues in 1993 exposed rats to 45 minutes of pulsed high frequency microwaves at low intensity and found that the rats showed retarded learning, indicating a deficit in spatial "working memory" function.

H Lai, A. Horita, and A. W. Guy, "Microwave Irradiation Affects Radial-Arm Maze Performance in the Rat," Bioelectromagnetics 15:95-104, 1994

[back] 22. Dr. Stefan Braune reported a 5-10 mm Hg resting blood pressure rise during exposure to a radiofrequency electromagnetic field of the sort used by cellular phones in Europe. The Lancet, the British medical journal where the report appeared, stated that "Such an increase could have adverse effects on people with high blood pressure."

S. Braune, "Resting Blood Pressure Increase During Exposure to a Radio-Frequency Electromagnetic Field," The Lancet 351, pp. 1,857-1,858, 1998

[back] 23. Dr. Kues and colleagues (of Johns Hopkins University and the Food and Drug Administration) found that placing timolol and pilocarpine into the eyes of monkeys and then exposing them to low power density pulsed microwaves caused a significant reduction in the power-density threshold for causing damage to the cells covering the eye and the iris. In fact the power was reduced by a factor of 10, so that it entered the "acceptable, safe" level of the FCC, 1 mW/cm^2! Timolol and pilocarpine are commonly used by people suffering from glaucoma. This is a very important study, as it points to the fact that laboratory experiments under "ideal" conditions are rarely what one finds in real life. The "safe" level of radiation exposure for healthy people is likely to be very different than for those of us who suffer from illness, take medications, or are perhaps simply younger or older than those in the experiments.

H. A. Kues, J. C. Monahan, S. A. D'Anna, D. S. McLeod, G. A. Lutty, and S. Koslov, "Increased Sensitivity of the Non-Human Primate Eye to Microwave Radiation Following Ophthalmic Drug Pretreatment," Bioelectromagnetics 13:379-393, 1992

[back] 24. The World Health Organization states that "concerns have been raised about the safety of cellular mobile telephones, electric power lines and police speed-control 'radar guns.' Scientific reports have suggested that exposure to electromagnetic fields emitted from these devices could have adverse health effects, such as cancer, reduced fertility, memory loss, and adverse changes in the behaviour and

development of children." Therefore, "In May 1996, in response to growing public health concerns in many Member States over possible health effects from exposure to an ever-increasing number and diversity of EMF sources, the World Health Organization launched an international project to assess health and environmental effects of exposure to electric and magnetic fields, which became known as the International EMF Project. The International EMF Project will last for five years." "A number of studies at [frequencies above about 1 MHz] suggest that exposure to RF fields too weak to cause heating may have adverse health consequences, including cancer and memory loss. Identifying and encouraging coordinated research into these open questions is one of the major objectives of the International EMF Project."

World Health Organization Fact Sheet N181, "Electromagnetic Fields and Public Health, The International EMF Project," reviewed May 1998 and World Health Organization Fact Sheet N182, "Electromagnetic Fields and Public Health, Physical Properties and Effects on Biological Systems," reviewed May 1998, underlining added

[back] 25. The U. S. Food and Drug Administration in a January 14, 1998 letter to the House Telecommunications Subcommittee stated it "believes additional research in the area of RF is needed." In 1997 the agency established the following priorities:

- Chronic (lifetime) animal exposures should be given the highest priority.
- Chronic animal exposures should be performed both with and without the application of chemical initiating agents to investigate tumor promotion in addition to tumorigenesis.
- Identification of potential risks should include end points other than brain cancer (e.g. ocular effects of RF radiation exposure).
- Replication of prior studies demonstrating positive biological effects work is needed. A careful replication of the Chou and Guy study (*Bioelectromagnetics, 13,* pp.469-496, 1992) which suggests that chronic exposure of rats to microwaves is associated with an increase in tumors, would contribute a great deal to the risk identification process for wireless communication products.
- Genetic toxicology studies should focus on single cell gel studies of DNA strand breakage and on induction of micronuclei.....
- Epidemiology studies focused on approaches optimized for hazard identification are warranted....

Food and Drug Administration Recommendations quoted in Microwave News, March/April, 1997

[back] 26. The International Agency for Research on Cancer (IARC) is planning a multicountry, multimillion dollar study of cancer among users of wireless phones, beginning 1998.

Microwave News, January/February, 1998

[back] 27. The Swedish Work Environmental Fund initiated a new epidemiological study on cellular phone radiation and brain tumors in 1997.

Microwave News, November/December, 1997

[back] 28. The National Cancer Institute announced plans for a 5 year study of brain tumors and cellular phone radiation in 1993.

Microwave News, January/February, 1993

[back] 29. The European Commission (EC) Expert Group on health effects of wireless phones called for a 5 year research program with a $20 million budget, reported 1997 .

Microwave News , January/February, 1997

[back] 30. A report commissioned by New Zealand's Ministry of Health stated that "It is imperative that the scientific issues be clarified as soon as possible, as there is much at stake." It called for more research to examine the potential health effects of RF radiation.

Microwave News, November/December, 1996

[back] 31. The National Health and Medical Research Council of Australia announced its sponsorship of a 5 year, $3.5 million project on potential health effects of mobile phone technology in 1996.

Microwave News, November/December, 1996

[back] 32. Finally, the Commonwealth Scientific Industrial Research Organization (CSIRO) of Australia concluded in 1995 that the safety of cellular telephones cannot be resolved "in the near future." Dr. Stan Barnett, a principal researcher of CSIRO, states that "My goal is to establish a national committee to approach this problem by coordinating relevant and focused research." He estimated a budget of $3 million over a 3 year period would be necessary.

Commonwealth Scientific Industrial Research Organization, "Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies," a report prepared by Dr. Stan Barnett, as sited in Microwave News, September/October, 1995

[back] 33. On July 19, 1993 Dr. Elizabeth Jacobson, Deputy Director for Science, Center for Devices and Radiological Health, Food and Drug Administration criticized Thomas Wheeler, President of the Cellular Telecommunications Industry Association:

"I am writing to let you know that we were concerned about two important aspects of your press conference of July 16 concerning the safety of cellular phones, and to ask that you carefully consider the following comments when you make future statements to the press. First, both the written press statements and your verbal comments during the conference seemed to display an unwarranted confidence that these products will be found absolutely safe. In fact, the unremittingly upbeat tone of the press packet strongly implies that there can be no hazard, leading the reader to wonder why any further research would be needed at all.....More specifically, your press packet selectively quotes from our Talk Paper of February 4 in order to imply that FDA believes that cellular phones are "safe." ("There is no proof at this point that cellular phones are harmful.") In fact, the same Talk Paper also states, "There is not enough evidence to know for sure, either way." Our position, as we have stated it before, is this: Although there is no direct evidence linking cellular phones with harmful effects in humans, a few animal studies suggest that such effects could exist. It is simply too soon to assume that cellular phones are perfectly safe, or that they are hazardous--either assumption would be premature. This is precisely why more research is needed."

Full text of letter can be found in Microwave News, July/August, 1993

[back] 34. In 1993 the Director of the Office of Radiation and Indoor Air of the Environmental Protection Agency suggested that the FCC not adopt the 1992 ANSI/IEEE standard "due to serious flaws," among them (1) "the ANSI/IEEE conclusion that there is no scientific data indicating that certain subgroups of the population are more at risk than others is not supported by NCRP and EPA reports" and (2) "the thesis that ANSI/IEEE recommendations are protective of all mechanisms of interaction is unwarranted because the adverse effects level in the 1992 ANSI/IEEE standard are based on a thermal effect."

Letter from Margo T. Oge, Director, Office of Radiation and Indoor Air to Thomas Stanley, Chief Engineer, Office of engineering and Technology, FCC, dated Nov 9, 1993

[back] 35. A brief sampling of the report, "Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies" follows:

Problems in studies of human populations published to date include imprecise estimates of exposure. As a result, such epidemiological studies may underestimate any real risk. The likelihood of epidemiological studies providing useful information is questionable, particularly if the biological end point cannot be predicted. Its value in the short term (less than 10 years) must be negligible unless there was an enormous increase in the rate of cancer growth. Interestingly, the incidence of brain tumors in the EC countries has increased substantially in recent years....

[RF] safety cannot be assessed in the absence of reported serious effects when so little research has been aimed at the problem. It is somewhat surprising, and rather disappointing, to find that although the literature contains many hundreds of publications, there are very few areas of consensus....At low levels the absence of clear thresholds and [the] presence of intensity and frequency windows have created questions rather than provided answers....

There is no doubt that the interpretation of bioeffects data has been clouded by a preoccupation with thermally mediated processes. In fact, development of the ANSI/IEEE standard is based only on well-established thermal effects, and ignores the more subtle nonthermal processes that are more difficult to interpret and apply to human health....

Commonwealth Scientific Industrial Research Organization, "Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies," a report prepared by Dr. Stan Barnett, as sited in Microwave News, September/October, 1995

[back] 36. The ICNIRP exposure guidelines are only designed to protect against "known adverse health impacts," according to Dr. Jürgen Bernhardt, ICNIRP's chairman. Bernhardt reviewed the updated limits, which cover the spectrum from 1 Hz to 300 GHz, in a presentation at the *20th Annual Meeting of the Biolectromagnetics Society* in St. Pete Beach, FL, on June 10. The limits protect against "short-term, immediate health effects" such as nerve stimulation, contact shocks and thermal insults, according to the guidelines, which appear in the April issue of *Health Physics* (*74*, pp.494-522, 1998). Despite "suggestive" evidence that power frequency magnetic fields can be carcinogenic, ICNIRP has concluded that this and other nonthermal health effects have not been "established." ICNIRP has long followed this approach to standard-setting. In his talk, Bernhardt noted that the guidelines include "no consideration regarding prudent avoidance" for health effects for which evidence is less than conclusive.

Microwave News, July/August, 1998, underlining added

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