

**Speech at San Francisco City Hall Opposing Proceeding Immediately With
a City-wide WiFi Hotspot**

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If I may, I would like to take some time to offer an overview of the technological developments and scientific findings that have led to today's concern about the wisdom of proceeding with another source of radio frequency radiation in our City. I want to remind us of what we have been experiencing and are likely to experience in the near future, both in new technology and biological response, and introduce some of the pertinent scientific issues. I will conclude with some policy issues that stem from a public health approach and the respect for the democratic process.

Technological Developments

WiFi is but part of the greater move into wireless. Following numerous species that have fallen by the way, we now see the acceptance of cordless phones, the convergence of Blue Tooth standards, the development of Worldwide Interoperability for Microwave Access, or WiMax, local half-duplex radio, wireless hubs, two-way paging systems, wirelessly connected entertainment systems, miniature cameras and microphones wirelessly feeding monitors and speakers, micro-radar distance sensors, RFID, security scanners, and the arrival of 3G cellular. And there are many others.

Among this lot, only cellular RF is regulated. All share the same physical space with commercial television and radio signals and a whole host of government radio and satellite communications transmissions. Most are transiting from analog to digital.

In this increasingly rapid adoption of wireless technologies, people are being exposed to ever denser modulated RF, particularly microwave, radiation and a growing profusion of protocols, frequencies, signaling techniques and usage duty cycles. This includes those who use such devices themselves and those who do not. They span the yet to be born to the very ill and elderly. Involuntarily, even regular users are being exposed to species of radiation they themselves do not use or are not using at the time. And this goes on all the time, 24 hours per day, awake and asleep, at home, at work, or at play.

Mayor Newsom's proposal to make the Internet accessible to San Franciscans anywhere within the City, including inside homes, by making San Francisco one big WiFi hotspot, will not impede even further increases in the general population exposure levels. Private WiFi will continue to expand. WiMax will someday make its debut here. And the many other forms of wireless systems will become more popular.

All of this would seem to be a good thing. But I suggest these optimists are overlooking, some intentionally, a very important consideration. Is this relatively new man-made element in our environment, namely modulated RF microwave radiation, safe for us? Does it affect our health and well-being?

Scientific Findings

We know that life is responsive to electromagnetic radiation, including the sorts used in these innovations. A simple example: a magnetic field induces little circular eddies of ions in our cytoplasm.

With further investigation, much more has been learned. In December of last year, Reuters reported that 12 research groups in seven European

countries found in their 4-year long Reflex study that a modulated slice of the electromagnetic spectrum, known as RF radiation, used by cell phones harm human and animal body cells and damage DNA in laboratory conditions. After being exposed to electromagnetic fields that are typical for cell phones, the cells showed a significant increase in single and double-strand DNA breaks. The damage could not always be repaired by the cells and there was remaining damage for future generation of cells. The change had procreated. Mutation had occurred. These results are consistent with those from the pioneering study by Drs. Henry Lai and N.P. Singh at the University of Washington Bioelectromagnetics Research Laboratory, which was later independently confirmed by Dr. Jerry Phillips of Motorola.

The Reflex study follows a Swedish study which found extensive lesions in three areas of the brains of middle-aged research rats proportionally exposed beginning as "teenagers" to cell phone radiation U.S. teenagers typically experience for proportional periods and frequency. Out of concern that kids might unwittingly be prepping themselves for early onset neurodegenerative diseases, these findings were reported without delay, including in the U.S. National Institutes of Environmental Health Sciences journal, Perspective, and became the topic of more popular magazines worldwide.

Granted, radiation from a cell phone experienced its user is higher than that in a WiFi hotspot, but only one cell phone is used at a time, only by that user, and not all the time. Some choose to use wired telephones, but they too receive radiation from nearby hotspots, laptops, palmtops, etc. Babies and young children most vulnerable to this radiation have no choice in the matter. For this reason, Sir William Stewart reiterated his concern that children avoid unnecessary use of cell phones and has recommended in the

year 2000 report of the Independent Expert Group on Mobile Phones and Health, which he chaired for the U.K. Department of Health, that the wishes of parents be respected for protective reasons concerning siting of base stations on or near schools and their grounds.

Exposure to radiation from cellular base stations has led to a wide variety of adverse health symptoms as found in published studies commissioned by the governments of Australia and the Netherlands and in an independent study done in France, demonstrating that long term low level exposure has consequences. Typical reported symptoms include sleep disturbances, headaches, dizziness, fatigue, nausea, cognitive problems, emotional flames, heart palpitations, high blood pressure, tinglings, blurry sight, loss of focus, memory loss, irritability, loss of appetite, depressive tendencies, skin problems, feelings of discomfort, lowering of libido, hearing disruptions, movement difficulties, and premature menopause. The French study showed a statistically significant increase in all 18 World Health Organization Non-Specific Health Symptoms for women and in 16 of 17 for men within 300 meters of a base station. The double-blinded study by the Dutch technological research institute for 3 Dutch ministries showed basically the same thing.

In addition to all these obvious effects, back in 2002 Dr. W. Ross Adey wrote to the Board of Radiation Effects Research, National Academy of Sciences, "The confirmed evidence of nonthermal extremely low frequency and microwave interactions has become clear, in observations ranging from human cognitive performance and human EEG sleep records, to cell and molecular effects on gene expression, enzyme activity, and permeability of the blood brain barrier. Though not yet conclusive, there is strong but not yet

unequivocal evidence supporting modulation-dependent interactions, including alterations in human sleep EEG power spectra by pulse modulated mobile phone fields, and an absence of effects of unmodulated (CW) fields of the same average incident power." Dr. Adey and the rest of us addressing the risks of WiFi are concerned about the effects – some observable by nonscientists - of modulated fields.

I am reporting on results of some of the more readily understandable current studies. Note that they were not done in the U.S. Except for funding of military research, federal funding for bioelectromagnetic research was halted in 1996 after the EPA published "An Evaluation of the Potential Carcinogenicity of Electromagnetic Fields" in 1990. In its draft researchers concluded that that RF and microwave radiation be classified as a "possible" human carcinogen, later raised by the researchers to a "probable" human carcinogen.

I am unaware of any specific studies on the bioeffects of exposure to the radiation required for WiFi. But several older, foreign or private independent studies point ominously to the effects of low power exposure to RF radiation:

- Stress response proteins have been detected following exposure of 0.001 W/kg specific absorption rate. These heat shock proteins are made to repair cellular damage. [de Pomerai et al, 2000] The U.S. RF radiation exposure guideline for public exposure is eighty times greater, or 0.08 W/kg.
- Increased calcium ion efflux has been measured following exposure of 0.005 W/kg specific absorption rate. Calcium is necessary for many life functions, particularly in neurons and muscles. [Dutta et al, 1989]

- Changes in the immunological function of mice has been detected at 1 microwatt/cm² power density exposure. [Fesenko, 1999] Here on these steps I have measured 2 GHz RF radiation power density of several microwatts/ cm².
- A decrease in the reproductive function in mice has been measured at as little as 0.2 microwatt/cm² exposure. [Magras and Xenos, 1999]
- A leaky blood brain barrier has been detected in mice at 0.0004 W/kg specific absorption rate, a level well below what they would experience here. The blood brain barrier is THE protective shield for the brain from harmful toxins. Typical cell phone exposure levels have the same effect on humans. [Persson et al, 1997]
- DNA damage was detected at 0.002 W/kg. [Phillips et al, 1998]
- A decrease in mitosis, or cell replication, has been measured after an exposure of 0.0002 W/kg. Cell division peaks during sleep. It allows for growth and repair of tissue. [Velizarov et al, 1999]

These study results came from short term exposures, a matter of minutes or a few hours.

The results of a few studies of long-term low power exposure are of particular relevance to today's concern about introducing comprehensive WiFi in San Francisco.

- 24 hour exposure has resulted in DNA damage that was shown to produce mutations that cumulate over time. [Phillips et al, 1998]

- Five generations of exposure to mice resulted in their inability to reproduce, proving that the effect is passed from generation to generation. [Magras and Xenos, 1999]
- The blood brain barrier became leaky in mice after enough energy from exposure to low power RF radiation had been cumulated. The threshold was 1.5 joules/kg. [Persson et al, 1997]

This suggests that a short-term/high intensity exposure can produce the same effect as a long-term/low intensity exposure and is another indication that RF radiation effects can cumulate over time.

- In a learning experiment, experimenters concluded that the threshold for behavioral and physiological effects of chronic (long-term) RF radiation exposure in the rat occurs at as little as 500 microwatts/cm² (0.14 W/kg). RF radiation can produce an effect at much lower intensities after an animal is chronically exposed. This can have a very significant implication on people exposed to RF radiation from transmission towers. [D'Andrea et al, 1986a]
- Bioeffects have been observed after long term low power exposure, but not after short term low power exposure. [Baranski, 1972; Takashima et al, 1979]
- Different effects were observed after different durations of exposure. [Dumanski and Shandala, 1974; Lai, 1989]

Thus, in many respects, effects from long-term exposure are different from those from short-term exposure, but, as previously noted, there is also indication that RF radiation effects can cumulate over time.

Policy

What might these findings portend for policy makers?

May I suggest that given that evidence exists that normal healthy functions and learning behavior in higher life is adversely affected by short-term and long-term exposure to low power RF radiation, it would be risky to assume that related consequences yet to be determined by science will prove to be either benign or salutary. By implication, the risk is multiplied by the number of people exposed. Mayor Newsom's proposal for City-wide public WiFi aims to reach everyone within the City, no matter where they might be or how robust their health, the riskiest possible approach.

One of the major arguments used to advance access to the Internet is greater educational opportunity for all. But what if, as the rat learning experiment demonstrated, people's ability to learn becomes worse with incrementally higher level long-term exposure? Or we become more irritable, or develop shorter attention spans?

And do we learn better when we are feeling any of the 18 Non-specific Health Symptoms like sleep disturbances, headaches, loss of focus, memory loss, or depression?

Some may experience none of the above, but some may have several symptoms or others. Some are particularly vulnerable to the effects of RF radiation, while others' health is more robust, at least until old age. So, are all people in San Francisco to be forced by City fiat, regardless of circumstances, to risk their health and well-being so that some might enjoy the convenience of free wireless access to the Internet?

It seems to me that San Franciscans deserve to know BEFORE they are exposed to City WiFi what might be the likely consequences to our health.

A solid survey of independent scientific findings to that end is in order. An absence of sufficient meaningful studies does not constitute license to proceed with the proposal. Rather, it would imply a City policy supporting independent scientific research of this subject and waiting until there is enough evidence to warrant, in the eyes of public health officials, a recommendation to the people of San Francisco consistent with the Precautionary Principle that it is safe to proceed with City sponsored WiFi.

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