

CELL TOWER REPORT

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CELL TOWERS AND WIRELESS COMMUNICATIONS – LIVING WITH RADIOFREQUENCY RADIATION

INTRODUCTION

This report is on the topic of cell towers and the possible ill health effects from exposure to the transmitting antennas for our wireless communications. These antennas are found on all wireless communications devices, such as cell towers, WiFi routers, and cell and cordless phones.

The information in my report is mostly limited to cell towers (also called masts and base stations). Towers, masts and base stations are not the issue in themselves. It is the transmitting antennas that are of concern. These antennas all have electromagnetic fields and emit radiofrequency radiation (EMF/RFR) part of the non ionizing radiation (NIR) on the electromagnetic spectrum.

Transmitting antennas may also be found on buildings and utility poles. The terms wireless communications devices and wireless telecommunications facilities are also used. My report will use many of these terms and they can be used interchangeably.

Please note, all wireless devices – such as cell phones, cordless phones and WiFi routers - have transmitting antennas. There have been many warnings on exposures to these devices as well. In particular cell and cordless phones, due to being held to the head, give much higher short-term exposure to RFR. **If anyone would like more information on cell and cordless phones please go to <http://www.ewg.org/project/2009cellphone/cellphoneradiation.php> to read the Environmental Working Groups recent report on the topic.**

I am a public health advocate. I am not an expert in this field, however I have researched this issue for the last three years. I started this research after I moved into a house that was 300 feet from cellular antennas and found myself unable to sleep for more than four hours a night and had difficulties with my mental capacity. I found I could not spell simple words and that my short-term memory was failing. After moving away from the antennas I no longer have these symptoms. From my international networking I have found countless numbers of people who have gone through similar experiences. From my research and my networking on this issue I am convinced that millions of people are being harmed by exposure to EMF/RFR at levels that are deemed safe by our government. As our government has not acknowledged this it is now my work to educate people so that they can take measures to minimize their exposure.

The Federal Communications Commission's (FCC) RFR exposure standards for wireless transmitters protect us from thermal heating. You may have heard that there is no evidence of harm other than thermal heating from exposure to RFR. The CDC, FDA and the FCC all make this claim. This simply is not true. The weight of the evidence is that there are indeed non-thermal biological effects, many of which are harmful to health. If one closely examines the body of research on EMF/RFR exposures it becomes apparent that the majority of the industry funded studies show no effect while the majority of the independent studies do.* Studies funded by the mobile phone industry are more than six times more likely to find "no problem" than studies funded by independent sources. Both sides offer conjecture as to why this is so. But the claim by industry and governmental agencies that there is no evidence is plainly false.

*(The cell phone industry has funded at least 87% of the research on this subject.)

A QUICK BACKGROUND

A quick background, we all know that RFR from a microwave oven heats food. The thermal effect is well established. The controversy over this issue is due to the belief of many scientists and governments that RFR can only have a heating effect and our exposure standards protect us from this heating, therefore they claim that it is perfectly safe to have RFR emitting devices in our bedrooms and next to our schools.

Why do they say this? Speculation is that it has to do with the money. Just as the tobacco industry was able to suppress science, the telecommunications industry suppresses science. They fund studies that find no results. They marginalize the researchers in the field who do find harmful effects. (Please see Study Bias Report in references.)

This massive industry had combined revenues of more than \$3.85 trillion in 2008. In 2007 the U.S. telecommunications industry spent almost \$250 million on political lobbying. Over the past decade, they have spent a grand total of nearly \$2.4 billion. Over 242,130 antenna sites have already been approved nationwide without any federal studies to assure safety of those living nearby.

(See

<http://www.plunkettresearch.com/Telecommunications/TelecommunicationsStatistics/tabid/96/Default.aspx> and

<http://articles.mercola.com/sites/articles/archive/2008/11/29/interview-with-expert-on-dangers-of-cell-phones.aspx>)

THE BIONITIATIVE REPORT

The **BioInitiative Report**, published in 2007, provides detailed scientific information on health impacts when people are exposed to EMF/RFR hundreds or even thousands of times below limits currently established by the FCC. The authors reviewed more than 2000 scientific studies and reviews, and concluded that the existing public safety limits are inadequate to protect public health. Their conclusion is that: From a public health policy standpoint, new public safety limits, and limits on further deployment of risky technologies are warranted based on the total weight of evidence. Their recommendation is to set an exposure standard of **0.1 $\mu\text{W}/\text{cm}^2$ limit (0.614 Volts per meter)**.

The report includes studies showing evidence for:

- Effects on gene and protein expression
- Genotoxic effects
- Stress response
- Effects on immune function
- Effects on neurology and behavior
- Brain tumors and acoustic neuromas
- Childhood cancers (leukemia)
- Reduced Melatonin production, Alzheimer's disease, and breast cancer

HOT SPOTS

Cellular antennas have power peaks at predetermined distances. These vary and are influenced by compounding exposure factors that can cause localized increases of RFR levels. Some of these factors are: other RFR emissions, from WiFi, cordless phones, etc. in the area will add to the overall RFR burden; reflective materials reflect RFR and create hot spots (just as they do in

microwave ovens); and, metal and wires are RFR conductors and may amplify the signals. In addition locations closest to and/or in direct line of sight of the transmitters will have elevated RFR levels relative to surrounding locations. These factors may perhaps cause the people who are in the elevated RFR zones over the tipping point into electrohypersensitivity (EHS) (Explained later).

According to the BioInitiative Report, the RFR level we evolved with was a billionth of a microwatt per centimeter squared ($10^{-12} \mu\text{W}/\text{cm}^2$) In 1997 the background RFR levels measured by Ed Mantiply of the FCC at areas on the ground near towers had increased 0.003 to $0.3 \mu\text{W}/\text{cm}^2$. A survey by Sage Associates in 2000 found RFR levels within 300 feet from cell towers to range from 0.01 to $3.0 \mu\text{W}/\text{cm}^2$. And an RFR survey near cell towers in Germany in 2002 found RFR levels of 0.02 to $10 \mu\text{W}/\text{cm}^2$. These readings were the highest at homes that were closest to and in direct line of sight of the transmitting antennas. **More recently, transmitters installed by T-Mobile on utility poles in San Francisco may emit RFR levels up to $190 \mu\text{W}/\text{cm}^2$.***

* (<http://noevalleyvoice.com/2009/December-January/T-Mo.htm>)

RFR monitoring uses spatial averaging -

*"Spatial-averaging is an RF radiation measurement technique used to determine the amount of RF exposure at a particular spot by averaging the electric and magnetic fields (squared) over an area equivalent to the area normally occupied by a standing human body. **The FCC ... expressed concerns about situations where a localized (spatial peak) field intensity exceeds the exposure limits near an antenna (which is potentially accessible to workers or the public) despite the fact that the spatially averaged measurement over the area indicates compliance with exposure limits. The concern is that localized hot spots could lead to exposure in the body of a nearby person that exceeds the partial-body limits while not exceeding the whole-body limit.**"**

At my former home, which was 300 feet from cell phone antennas located on a two-story building with direct line of sight, the RFR measurements were at the highest level at my head height and the lowest level was at my feet. Personally I am more concerned about the RFR going straight to my head than I am over the average of the exposure to my entire body and I find the use of spatial averaging to be a duplicitous method of determining safe exposure levels to RFR.

GUIDELINES

According to researcher Magda Havas, PhD, BSc, RFR exposure guidelines, used in our wireless communications, range 5 orders of magnitude in countries around

the world. The lowest guidelines are in Salzburg Austria. Salzburg's guideline is at the BioInitiative Report's recommended level of $0.1 \mu\text{W}/\text{cm}^2$. **In the U.S. it is $1000 \mu\text{W}/\text{cm}^2$.** Why do we have guidelines that are so much higher? Our guidelines are based on a short-term (6-minute) heating effect. It is assumed that if this radiation does not heat your tissue it is safe. This is not correct. Effects are documented at levels well below those that are able to heat body tissue. These biological effects include increased permeability of the blood brain barrier, increased calcium flux, increase in cancer and DNA breaks, induced stress proteins, and nerve damage. Exposure to this energy is associated with altered white blood cells in children; childhood leukemia; impaired motor function, reaction time, and memory; headaches, dizziness, fatigue, weakness, and insomnia.

While most people want wireless communications, the siting of transmitters needs to be based on minimizing harm. **If there will be children or homes close to the antennas these people are more susceptible to harm from RFR exposure as chronic long-term exposure leads to cumulative damage and the development of electrohypersensitivity and children's smaller bodies absorb more radiation.*** In addition, wildlife, with bees in particular, may have their navigational abilities interfered with due to RFR exposure.

**Lai and Singh confirmed in 1997 that EMF exposure has cumulative effects.*

Below are excerpts from Wolfgang Scherer's report on the cumulative exposure to RFR and the need for new exposure standards:

<http://www.reach.net/~scherer/p/biofx.htm>

$0.3 \text{ mW}/\text{cm}^2$ resulting in a value of $3\mu\text{W}/\text{cm}^2$

*...To be useful exposure standards have to give a peak limit and a dosage limit. The power we get from our utility is measured in Kilo-Watt-Hour, a unit used to measure accumulated power consumption over a time period. A unit for accumulated exposure to radiofrequency radiation should be established in the same manner, for example mWh/cm^2 . If we use the exposure rates allowed by Safety Code 6 we get as an accumulated dose $1 \text{ mWh}/\text{cm}^2$ for one hour but $0.4 \text{ mWh}/\text{cm}^2$ for a minute...**science has yet to come up with a dose that can be endured without damage, setting a radiation level that can be considered safe for permanent exposure...***

From the allowable occupational exposure it could be calculated that by multiplying this number with 8 hours of a work shift, an allowable dose of $8 \text{ mWh}/\text{cm}^2$ per day could be established. But this would then only be valid for an 8-hour work shift with a 16-hour recovery period and would establish an occupational exposure level only.

A further linear reduction to 0.3 mW/cm² as a permanent exposure rate causing the same dose over a 24-hour period is merely a mathematical exercise and does not address accumulation with no recovery period. More problematic if that exposure is not occupational but involuntary.

THE STUDIES

Industry and governments state that there are no studies proving cell towers are unsafe. While it is true that it is impossible to exactly duplicate our ambient exposures to RFR in the environment in a laboratory setting, **there are numerous studies, which show biological harm at RFR levels well below our environmental exposure from neighborhood cell towers.**

There are more than 13,000 studies on Pub Med on the topic of EMF/RFR exposure and possible harmful effects. I do not have the expertise or the time, and I imagine you do not either, to go through all of these studies to determine if the studies are sound or if they are flawed. Most studies have some flaws, as there are limitations to replicating and measuring real time exposure to RFR. I am relying on the work of researchers in this field and reporting on their findings.

As there are very few valid epidemiological studies on cell towers and health – The World Health Organization has only 14 studies that meet their criteria in their database – it is necessary to examine evidence of exposures that are of a similar level as one would receive from RFR antennas on a cell tower. I have included some of these studies.

Included in Dr. Magda Havas' WiFi report for San Francisco, Dr. Henry Lai, PhD, compiled a list of studies that document biological effects of RFR at low intensities. (See [07_Havas_WiFi_SNAFU.pdf](#))

All of the 40 reports, reviewed by Dr. Henry Lai, document biological effects or associations, many of them adverse or undesirable, at exposure to RFR below the FCC guidelines for both power density (1000 $\mu\text{W}/\text{cm}^2$) and specific absorption rate (0.08 W/kg). Of the 12 studies that provide power density data, 11 document effects below 41 $\mu\text{W}/\text{cm}^2$ (scenario of woman using her laptop computer on her balcony); 6 document effects below 6 $\mu\text{W}/\text{cm}^2$ (exposure to multiple Wi-Fi antennas); and 3 document effects below 1 $\mu\text{W}/\text{cm}^2$ (exposure to 1 Wi-Fi antenna).

Epidemiological evidence also shows cause for concern over RFR exposure from cell towers.

In fact 10 out of the 14 peer-reviewed studies analyzed, and conforming to the specified WHO/ICNIRP standards of scientific quality, including their assessment criteria of consistency and replication found significant increases in ill health effects. Included in this database are only those studies that are about cell tower exposures. (Kundi, 2008 at the London EMF International Conference). Populations close to cellular antennas show an increase in the effects of ill health in those closest to the antennas with the risks factors dropping off as distance and RFR levels decrease. Symptoms ranged from sleeps disturbances to breast and brain cancers.

Researchers at Powerwatch UK found that 23 out of 31 epidemiological studies that met their criteria show significant health risks.

Epidemiological studies are not proof of cause, however they do show associations and are used to set policy on many environmental exposures. In fact there is very little scientific proof that tobacco causes lung cancer or even for ionizing radiation and ill health effects. For the most part we rely on epidemiological studies to show the strong correlation between environmental exposures and ill health.

BIOLOGICAL PROCESSES

What is going on here? All electronic devices have an EMF field. Our wireless communications devices also emit RFR. Basically when an electric field is turned on and off fast enough, it switches to a magnetic field and back to an electric field repeatedly, this creates electro-magnetic radiation.

Subsequently, RFR causes the polarity in cells to continuously reverse. This is what causes heating in our food in our microwave ovens. But what happens to living biological systems when the polarity of cells continuously reverses? This phenomenon interferes with cellular function and may explain why there is a wide range of symptoms from RFR exposure. According to Andrew Goldsworthy, BSc, PhD, additionally, *"our wireless communication devices use amplitude-modulated radio waves where the signal strength rises and falls. These have been shown to be further damaging as they can remove structurally important calcium ions from cell membranes at levels far below the thermal effect. This results in an increased leakage of materials through cell membranes that can affect many aspects of metabolism. These include damage to DNA, from digestive enzymes leaking from lysosomes, apoptosis (cell death), the generation of false nerve impulses from calcium leakage in brain cells (causing hyperactivity, impairing normal mental function and generating many of the known symptoms of electromagnetic hypersensitivity)*

Claims by the industry that the cellular antennas are safe because the radiation falls off rapidly with distance are flawed. The biological response will remain more or less constant over a wide range of signal strengths due to the ways in which living cells routinely use 'negative feedback' to compensate for changes in their environment."

VULNERABLE POPULATIONS

ELECTROHYPERSENSITIVITY

A growing population is adversely affected by these electromagnetic frequencies. Long-term chronic exposure to RFR may lead to electrohypersensitivity (EHS). EHS is recognized as a disability in Sweden where it is estimated that up to 3% of the population is EHS. Magda Havas, PhD, a researcher in this field, has stated that from her, soon to be published, research she finds that up to 35% of the population exhibits some sensitivity.

The World Health Organization defines EHS as:

<http://www.who.int/mediacentre/factsheets/fs296/en/index.html>

"[...A phenomenon where] individuals experience adverse health effects while using or being in the vicinity of devices emanating electric, magnetic, or electromagnetic fields (EMFs)...EHS is a real and sometimes a debilitating problem for the affected persons, while the level of EMF in their neighborhood is no greater than is encountered in normal living environments. Their exposures are generally several orders of magnitude under the limits in internationally accepted standards.

The WHO Fact sheet goes on to state:

Treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home. "

This indication that EHS is a mental disorder rather than biologically caused from exposure to EMF/RFR is replicated throughout governmental agencies and has led to a worldwide citizen movement of EHS sufferers having to resort to their own efforts to remove themselves from high EMF/RFR exposures.

Dr. Havas' double blind 100 person study on self-identifying EHS subjects and controls examined the heart's reactivity to the RFR emitted by common DECT cordless phones. Most of the volunteers did not respond to the exposure, but

those who did respond experienced arrhythmia (irregular beats of the heart) and/or tachycardia (rapid heart rate). These symptoms were often accompanied by feelings of anxiety.

While other exposure studies on self-identifying EHS subjects have not found such strong evidence, these studies have not measured biological effects. Rather they relied on subjective reports from the test subjects.

Symptoms of EHS include sleep disturbance, fatigue, pain, nausea, skin disorders, problems with eyes and ears (tinnitus), and dizziness. Again, it is estimated that 3% of the population are severely affected and another 35% have moderate symptoms. Prolonged exposure may be related to sensitivity and for this reason it is imperative that children's exposure to RFR be minimized as much as possible.

CHILDREN'S SENSITIVITY

Children are more sensitive to environmental contaminants and that includes RFR. Their smaller bodies proportionally absorb more RFR than adult bodies. The Stewart Report (UK 2000) recommended that children not use cell phones except for emergencies. Many countries including France, the United Kingdom, Russia, Japan, Germany, Israel, India, Austria and Belgium have all issued public health warnings regarding children and have placed limitations on cell phone use, WIFI in schools and even changed EMR regulations. (See http://thepeoplesinitiative.org///Home_Page.html)

CONCLUSIONS AND WARNINGS

WARNINGS

Scientists, doctors and governmental agencies worldwide have issued warnings, restrictions and resolutions urging limiting exposure to EMF/RF. Due to the numbers of people suffering from symptoms of EHS, medical doctors and scientists have issued resolutions stating that there is a more sensitive population to RFR and that antennas should not be sited near homes, schools and hospitals. These run from the Vienna Resolution in 1998 through to the Porto Alegre Resolution in 2009.

In 2009 **three U.S. Governors**, of Florida, Connecticut and Colorado, declared Electrohypersensitivity Awareness months.

In May, 2009 the **LA Unified School District**, which restricts cell towers on school property passed a resolution attempting to restrict antennas near school

property and in April, 2009, the **EU Parliament** adopted, by 559 votes to 22, with 8 abstentions, a resolution on health concerns associated with electromagnetic fields (EMFs) which includes criteria for setting up [Cell Towers] or high-voltage power lines. They state: "In this context, it is important to ensure at least that schools, crèches [nursery schools], retirement homes, and health care institutions are kept clear, within a specific distance determined by scientific criteria, of facilities of this type."

The Vancouver School Board (VSB) passed a resolution in January 2005 that prohibits construction of cellular antennas within 1000 feet (305 m) from school property.

Palm Beach, Florida, Los Angeles, California, and New Zealand have all prohibited cell phone base stations and antennas near schools due to safety concerns. The decision not to place cell antennas near schools is based on the likelihood that children are more susceptible to this form of radiation.

In January 2008, the National Research Council (NRC), an arm of the National Academy of Sciences and the National Academy of Engineering, issued a report saying that we simply do not know enough about the potential health risks of long-term exposure to RF energy from cell phones themselves, cell towers, television towers, and other components of our communications system. The scientists who prepared the report emphasized, in particular, the unknown risks to the health of children, pregnant women, and fetuses as well as of workers whose jobs entail high exposure to RF (radiofrequency) energy. The report called for long-term safety studies on all wireless devices including cell phones, computers, and cell phone towers and states:

Wireless networks are being built very rapidly, and many more base station antennas are being installed. A crucial research need is to characterize radiated electromagnetic fields for typical multiple-element base station antennas and for the highest radiated power conditions with measurements conducted during peak hours of the day at locations close to the antennas as well as at ground level.

CONCLUSIONS

The FCCs Telecommunications Act of 1996 (TCA) Section 704 prevents local governments from effectively regulating the placement of wireless communications facilities on the basis of potential or known environmental or health effects of radiofrequency radiation. The FCC issued a recent ruling (11/18/09) on antenna siting. They found: *In the event a State or local government fails to act within the appropriate time period, the applicant is entitled to bring an action in court under Section 332(c)(7)(B) (v) of the Communications Act, and the court will determine whether the delay was in fact unreasonable under all the circumstances of the case. We conclude that the*

record supports setting the following timeframes: (1) 90 days for the review of collocation applications; and (2) 150 days for the review of siting applications other than collocations.

*Accordingly, if State or local governments do not act upon applications within those timeframes, then a "failure to act" has occurred and personal wireless service providers may seek redress in a court of competent jurisdiction within 30 days, as provided in Section 332(c)(7)(B) (v). The State or local government, however, will have the opportunity to rebut the presumption of reasonableness.**

(* <http://www.fcc.gov/> November 18, 2009 "FCC Issues Declaratory Ruling Establishing Timeframes for State and Locality Processing of Applications for Wireless Towers")

This means that once an antenna application has been filed the wireless company can sue the state or local government if they have not either approved or denied the application within 150 days. This new ruling will force much faster action on cell tower siting than there has been in the past. Montgomery County, MD filed comments to the FCC against this new ruling, as did many local governments. Our current President Obama also filed comments against this while he was still a Senator from Illinois. The CTIA petition to the FCC asked that an antenna application be considered passed if it was not denied within 45 days so the FCC did not give in completely to their shot clock request.

The wide variance in RFR exposure limits around the world is due to the fact that some countries dismiss non-thermal biological effects from RFR exposure. Their limits only protect against thermal heating. Many countries, in Europe in particular have lower limits that factor in the non-thermal effects, which have been shown to occur at levels thousands of times lower than the thermal effects. The BioInitiative Report recommends an RFR exposure level of $0.1 \mu\text{W}/\text{cm}^2$. Our standard is $1,000 \mu\text{W}/\text{cm}^2$.

I do not know what the current background ambient RFR levels are, but as we are experiencing a continuous growth in wireless antennas it is presumably higher than the level found in 2000. Each additional antenna adds to this background level. This means that WiFi, DECT phone and individual cell phones and PDAs all add to the ambient background RF levels found near cell towers. It is the people who will have long-term involuntary exposure within approximately 1,000 feet (excepting compounding amplifying RF factors) of the antennas that are most susceptible to harm.

There are simple measures that will minimize harm from EMF/RFR exposure, such as: keeping WiFi routers out of areas where more time is spent, or even better turned off when not in use; making sure wiring is grounded and either shielded, braided or twisted, which all minimize EMF/RF exposure; minimizing metals in and out of our bodies; keeping antennas from having direct line of site and at a

minimum of 1,000 feet of homes and schools, etc (Although this is dependent on the strength of the transmitters.); minimizing electric devices in bedrooms; making DECT cordless phones and WiFi routers that only emit RFR when in use; and only using cordless and cell phones with head sets, speaker mode and texting.

More complex measures would be to have system compatibility and planned infrastructure roll out. With our Business As Usual attitude this may no longer be possible. Instead of creating the false siting restrictions based on appearance, we should have based it on health. Antennas should be sited where they will do the least harm and anyone who is in a hot spot should be compensated in some way. Shielding or relocating would both help. The best way to avoid intended and unintended RFR is to install fiber optics as the system has no RFR emissions. Instead of adopting these measures, the injured are left to their own devices. Industry has done its best to label the people they have harmed as being crazy.

In addition to the above measures, Dr. George Carlo, chairman of the Wireless Technology Research program (WTR) from 1993 – 1999, a \$28.5 million research program, funded by the cellular phone industry that investigated the possible health effects of cellular phones wrote in a recent article in the American Trial Lawyer that:

"Laws should be enacted to place health warnings on cell phones and wireless devices, as well as warning signs in public spaces that carry WiFi and other wireless signals.

The Telecommunications Act must be amended to include victims' compensation provisions; incentives for the development and commercialization of technologies to promote users from harmful electromagnetic radiation; and civil rights provisions to promote environmental and health risk protection for homeowners in communities where cell phone base stations and other wireless infrastructure are constructed."

It is imperative that the U.S. government reexamines our RFR exposure level and adjusts it to protect populations from having their health adversely impacted by RFR exposure. The Telecommunication's Act of 1996 needs to be revised to allow local oversight and health concerns as part of the criteria for antenna siting. **The Coalition for Local Oversight of Utility Technologies is working on this effort here in the U.S.** I urge you to get involved and advocate for lower RFR exposure standards. **Please go to www.cloutnow.org to find out how you can get involved in this important work.**

REFERENCE WEBSITES

OET Bulletin 65 FCC Guidelines for Evaluating Exposure to RF Emissions
..... 7 ...

FCC on Spatial Averaging and Hot Spots When using a broadband survey instrument, spatially-averaged exposure levels may be determined by slowly moving the probe while scanning over an area approximately equivalent to the vertical cross-section (projected area) of the human body. ...The term "hot spots" has been used to describe locations where peak readings occur...Often such readings are found near conductive objects, and the question arises as to whether it is valid to consider such measurements for compliance purposes. According to the ANSI C95.3 guidelines (Reference [2]) measurements of field strength to determine compliance are to be made, "at distances 20 cm or greater from any object." Therefore, as long as the 20 cm criterion is satisfied, such peak readings should be considered as indicative of the field **at that point...**in many situations there may be several RF sources. For example, a broadcast antenna farm or multiple-use tower could have several types of RF sources including AM, FM, and TV, as well as CMRS and microwave antennas...In such situations it is generally useful to use both broadband and narrowband instrumentation to fully characterize the electromagnetic environment. Broadband instrumentation could be used to determine what the overall field levels appeared to be, while narrowband instrumentation would be required to determine the relative contributions of each signal to the total field if the broadband measurements exceed the most restrictive portion of the applicable MPEs...

http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65

Selected excerpts to

Biological Effects of Radiofrequency Radiation (revised 2. February 1996)
Cut/condensed from **Biological Effects of Radiofrequency and Microwave Radiation: Application, Hazards, and Safeguards.** By Wolfgang W. Scherer (25. March 1994)

- **mW = milli-Watt = 1/thousandth Watt = 10^{-3} Watt**
- **μ W = micro-Watt = 1/Millionth Watt = 10^{-6} Watt**
- **nW = nano-Watt = 1/Billionth Watt = 10^{-9} Watt**
- **pW = pico -Watt = 1/Trillionth Watt = 10^{-12} Watt**

<http://www.reach.net/~scherer/p/biofx.htm>

BioInitiative Report (See also - Sage C, Carpenter DO. 2009. Public health implications of wireless technologies, Pathophysiology Aug; 16(2-3): 233-46)

<http://www.bioinitiative.org/>

Pathophysiology (2009) Electromagnetic Fields in Biology and Medicine. Vol. 7, No. 2.

http://www.elsevier.com/wps/find/journaldescription.cws_home/524214/description#description

Los Angeles Unified School District May 26, 2009 Resolution on Wireless Telecommunication Installations

<http://www.cloutnow.org/>

2009 European Parliament Resolution Health concerns associated with electromagnetic fields

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0216+0+DOC+XML+V0//EN>

21.04.2009

The European Parliament's Committee on the Environment, Public Health and Food Safety recently voted overwhelmingly to recommend precautions be taken to protect human health with regard to wireless technologies, such as mobile phones, Wi-Fi/Wi-Max, Bluetooth, DECT portable phones and cell towers. That certain establishments be kept free of wireless radiation, including schools, day care centers, retirement homes and health care institutions;

* Recognition that persons with Electrohypersensitivity are 'disabled' so as to assure them protection and equal opportunity under law.

* For member states to create maps of sources of exposure and make them available to citizens on the Internet including description of power line emissions and radiofrequency and microwave radiation;

* That Regional Antenna Plans be integrated into Urban Development Plans; and,

* That Member states create yearly reports on electromagnetic radiation, describing the sources and actions that have been taken to better protect human health and the environment.

January 2008 National Academy of Science Report Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communication Devices

<http://www.nap.edu/catalog/12036.html>

"In January 2008, the National Research Council (NRC), an arm of the National Academy of Sciences and the National Academy of Engineering, issued a report saying that we simply don't know enough about the potential health risks of long-

term exposure to RF energy from cell phones themselves, cell towers, television towers, and other components of our communications system. The scientists who prepared the report emphasized, in particular, the unknown risks to the health of children, pregnant women, and fetuses as well as of workers whose jobs entail high exposure to RF (radiofrequency) energy....Because so much of cell phone technology is new and evolving, we don't have data on the consequences of 10, 20 or 30 years worth of exposure to the RF energy they emit," Weil concluded. The report called for long-term safety studies on all wireless devices including cell phones, computers, and cell phone towers.

EMF resolutions signed by concerned scientists and medical doctors

Vienna Resolution 1998 www.emrnetwork.org/research/vienna.htm

Salzburg Austria Resolution 2000 www.salzburg.gv.at/salzburg_resolution_e.pdf

Freiburger Appeal 2002 www.laleva.cc/environment/freiburger_appeal.html

Catania Italy 2002 www.emrpolicy.org/faq/catania.pdf

Benevento Italy Resolution 2006

http://www.icems.eu/benevento_resolution.htm

Venice Italy Resolution 2008 <http://www.icems.eu/resolution.htm>

Porto Alegre Resolution 2009 www.icems.eu

Local Government Resolutions

<http://www.cloutnow.org/>

Los Angeles, California

The Los Angeles County Board of Supervisors voted unanimously on Tuesday, June 2, 2009, to "actively seek and support federal legislation to repeal limitations on state and local authority imposed by the Telecommunications Act of 1996 that infringe upon the authority of local governments to regulate the placement, construction, and modification of telecommunications towers and other personal wireless services facilities on the basis of the health and environmental effects of these facilities."

Tucson, Arizona

The Pima County Board of Supervisors passed a resolution on August 4, 2009, calling "for the U.S. Congress and the Obama administration to repeal Section 704 of the Federal Telecommunication Act of 1996, and otherwise let local jurisdictions control fully the siting, construction and installation of wireless communications facilities in order to ensure that their constituents' environment, health and safety are protected from the potentially damaging effects of electromagnetic radiation."

Sebastopol City Council

The City Council of Sebastopol, California, passed a resolution on July 7, 2009, instructing the City's legislative advocates "to actively seek and support federal legislation to repeal limitations on state and local authority imposed by the Telecommunications Act of 1996 that infringe upon the authority of local governments to regulate the placement, construction, and modification of telecommunications towers and other wireless facilities on the basis of the health and environmental effects of these facilities."

Glendale, California

The City Council of Glendale, California, passed a resolution on June 9, 2009, directing the City staff "to have its federal legislative advocates communicate to the U.S. Congress, the President and executive branch members to: (1) actively seek and support federal legislation that would give local governments greater flexibility to regulate the placement of wireless communications facilities given the unique aesthetic and safety issues that said facilities raise and to regulate such facilities in favor of less intrusive and more efficient technologies; (2) urge that the federal government engage in a comprehensive study of the effects of Wireless facilities RF emissions to assess the health impacts of these emissions; and (3) to review and revise those provisions of the Telecommunications Act of 1996, including but not limited to Section 332(c)(7)(B), that limit or compromise the rights of local zoning authorities to govern over the placement, construction and modification of wireless communications facilities on the basis of environmental effects of radio frequency emissions, until all environmental exposures are cumulatively considered."

Portland City Council

The City Council of Portland, Oregon, passed a resolution on May 12, 2009, requesting "the FCC to work in cooperation with the FDA and other relevant federal agencies to revisit and update studies on potential health concerns arising from RF wireless emissions in light of the national proliferation of wireless use."

Albany, California

The City Council of Albany, California, passed a resolution on July 20, 2009, requesting "the FCC to work in cooperation with the FDA and other relevant federal agencies to revisit and update studies on potential health concerns arising from RF wireless emissions in light of the national proliferation of wireless use."

Three U.S. Governors declared May 2009 Electromagnetic Hypersensitivity Awareness Month

<http://electromagnetichealth.org/electromagnetic-health-blog/three-us-governors-acknowledge-health-impacts-of-electromagnetic-pollution-from-wireless-technologies/.B>

Epidemiological evidence

Published research into mobile phone base station health effects

PowerWatch UK Database of Cell Tower Studies

<http://www.powerwatch.org.uk/science/studies.asp> (Please scroll down to the section on Mobile Phone Masts, the term for Cell Towers in the UK)

23 out of 31 epidemiological studies they found to meet their criteria show significant health risks.

WHO Database - 10 Out of 14 Peer Reviewed Studies Found Significant Health Symptoms

<http://www.scribd.com/doc/11484728/10-Out-of-14-Peer-Reviewed-Studies-Found-Significant-Health-Symptoms>

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TBB-4VRWNH1-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&_view=c&_auct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=b22f07bbd6f4e2076bdc07dbc4e94df6

Review of 14 studies collected from the WHO database and put together by Michael Kundi, a, and Hans-Peter Huttera. 10 out of the 14 peer-reviewed studies analyzed, and conforming to the specified WHO / ICNIRP standards of scientific quality, including their assessment criteria of consistency and replication found significant increases in ill health effects. Included in this database are only those studies that are about cell tower exposures. (Kundi, 2008 at the London EMF International Conference). Populations close to cellular antennas show an increase in the effects of ill health in those closest to the antennas with the risks factors dropping off as distance and RFR levels decrease. Symptoms range from sleeps disturbances to breast and brain cancers.

Low-level Exposure Studies

Reported Biological Effects From Radiofrequency Non-Ionizing Radiation

<http://www.wave-guide.org/library/studies.html#std>

The following studies indicate biological effects at exposure levels far below what would be explained by "thermal effects", and well within the range people are commonly exposed to every day. NOTE: Most of these exposures lie FAR BELOW the current advisory exposure standards in the US, which are based on thermal effects only.

Havas, M. 2007. Analysis of Health and Environmental Effects of Proposed San Francisco Earthlink Wi-Fi Network. Sent to Board of Supervisors, City and County of San Francisco, May 31, 2007, 51 pp.
<http://www.magdahavas.org/2009/10/10/san-francisco-wi-fi-and-health/>

LABORATORY AND EPIDEMIOLOGICAL STUDIES

Dr. Henry Lai (University of Washington) compiled a list of studies that document biological effects of radio frequency radiation at low intensities (Table 2).

Radio Wave Packet

File Format: PDF/Adobe Acrobat - Quick View

Radio Wave Packet by. ARTHUR FIRSTENBERG. President, Cellular Phone Taskforce. September 2001. Contents. 1. Some Biological Effects of Radio Waves ...

www.goodhealthinfo.net/radiation/radio_wave_packet.pdf

Firstenberg (6) also compiled a list of studies showing biological effects at levels below federal guidelines for radio frequency radiation

Magda Havas, PhD Research Demonstrating Increased Heart Rate from Wireless Radiation Exposure at the EMR Policy Institute's Conference in Golden, CO, Sunday, November 8th, 2009

<http://electromagnetichealth.org/electromagnetic-health-blog/magda-havas-phd-to-present-research-demonstrating-increased-heart-rate-from-wireless-radiation-exposure-at-the-emr-policy-institute-conference-in-golden-co/>

RFR Standards and Measurements Over Time

www.bioinitiative.org/report/docs/section_20.pdf

Original extra-planetary sources of microwave radiation were infinitesimally small, on the order of a billionth of a microwatt per centimeter squared (10^{-12} uW/cm²). Human evolution took place without any appreciable exposure to microwave radiation from background sources. The human body has no evolutionary protection against microwave radiation, as it does for ultraviolet radiation from the sun (Johannson, 2000). Wireless voice and communications have introduced unprecedented levels of public exposure in the last decade.

Mantiply (1997) measured and reported common sources and levels of RF in the environment. He identified areas near cellular base stations on the ground near

towers to be from 0.003 to 0.3 $\mu\text{W}/\text{cm}^2$. Background level ambient RF exposures in cities and suburbs in the 1990's were generally reported to be below 0.003 $\mu\text{W}/\text{cm}^2$.

Hamnerius (2000) reported that ambient RF power density measurements in twelve (12) large cities in Sweden were roughly ten times higher than in the United States for equivalent measurement locations by Mantipliy in 1978 (when no cellular phone service existed in the US). He reported a total mean value of 26 measured sites in the study was 0.05 $\mu\text{W}/\text{cm}^2$ and the median value was 40 $\mu\text{W}/\text{cm}^2$. An office location with a base station nearby at about 300 feet distance tested 150 $\mu\text{W}/\text{cm}^2$. A train station with antennas mounted indoors tested at about 3 $\mu\text{W}/\text{cm}^2$. Both indoor and outdoor ambient RF power density measurements showed high variability depending on proximity to transmitting antennas.

Sage Associates reported on microwave frequency RF power density levels at outdoor locations both near and far from wireless antenna sites in the United States (Sage, 2000).

Within the first 100-300 feet, power density levels have been measured at 0.01 to 3.0 $\mu\text{W}/\text{cm}^2$. Elevated RF power density levels from a major wireless antenna site can often be detected at 1000 feet or more. Power density levels away from wireless antenna sites measure between 0.001 $\mu\text{W}/\text{cm}^2$ to 0.000001 $\mu\text{W}/\text{cm}^2$

[PDF] HF-RADIATION LEVELS OF GSM CELLULAR PHONE TOWERS IN RESIDENTIAL AREAS

File Format: PDF/Adobe Acrobat - Quick View

exposure assessment for cellular phone tower radiation in Germany. antenna site, the GSM radiation levels are scattered due to various possible role of radio-frequency radiation in the development of uveal melanoma" in: ...

http://www.emfrf.com/pdf/RF_Radiaton_from_Cellular_Towers_in_Residential_Areas.pdf

RFR levels at cell towers in Germany in 2002 ranged from:

Low reading: .02 $\mu\text{W}/\text{cm}^2$ (200 $\mu\text{W}/\text{m}^2$)

High reading: 10 $\mu\text{W}/\text{cm}^2$ (100,000 $\mu\text{W}/\text{m}^2$)

1uw/m² = .0001 $\mu\text{W}/\text{cm}^2$

Abstract (Excerpts)

...A statistical evaluation of over 200 representative high frequency field measurements is presented for the years 2001 and 2002. Measurements were conducted at different distances and directions using a frequency selective spectrum analysis to obtain only GSM power densities... Derived from this data, GSM cellular phone tower radiation is dominant in comparison to FM radio or TV emissions. The median power density was found to be in the range of 200 $\mu\text{W}/\text{m}^2$ with the maximum level exceeding 100,000 $\mu\text{W}/\text{m}^2$. A total of 25 percent

of the power densities exceeds $1,000 \mu\text{W}/\text{m}^2$, which has been suggested to be the average threshold value for non-thermal biological effects. Two of the most important factors are the distance and the direct line of sight to the antenna site. At the typical residential cell tower distance of about 250 m in cities, with direct line of sight, the observed levels are in the range of $200 \mu\text{W}/\text{m}^2$. The results show that, especially for future cellular UMTS applications, there are several options to minimize additional HF radiation exposures for the population and reduce the potential risk for harmful exposures...

...Distance, Line of Sight and Exposure Parameters

The power density values are displayed in Figure 2 in respect to line of sight/without line of sight and the distance to the antenna site. It is obvious, that especially in proximity to the antennas site (<250 m), the GSM radiation levels are scattering due to various influencing parameters and cannot be calculated easily by using antenna power and distance modest only. Table 1 shows a significant systematic difference between the percentile data from line of sight and without line of sight measurements. Figure 2 displays the separated sets of data with trend lines decreasing exponentially to larger distances with lower exposures for without line of sight measurements in the range of 90% reduction (-10dB).

In general, the radiation exposure is predominantly determined by e.g. the following parameters:

Distance to antenna

Line of sight to the antenna site

Type of antennas, e.g. omni directional or directional antennas

Number, power, and orientation of the antennas

Capacity of the antenna site (number of channels/frequencies)

Vertical distance between location and antenna site

Type of building construction/ type of window glass

Total reflection of the environment

...Directly below roof top positions (e.g. schools, preschools, homes) significant exposures in the range of a few $1,000 \mu\text{W}/\text{m}^2$ were observed due to secondary side lobes and reflections. During our data collection, the highest exposure values in the range of $10,000 - 100,000 \mu\text{W}/\text{m}^2$ were observed very close to low antenna/roof top positions at inside and outside locations in line of site and distance < 100 meter.

Warnings for children

http://thepeoplesinitiative.org///Home_Page.html

The following countries have issued warnings and precautionary measures regarding cell phones and children. This is an incomplete list and ever changing. It is not kept up to date and these recommendations may change with the politics of the country, the UK being a classic example of that

Indian Government Urges Cautions for Children and Pregnant Women
<http://us.oneworld.net/article/indian-government-cautions-against-ill-effects-mobile-phones>

Germany, Frankfurt - Bans WIFI in the Classroom in Fear of Health Effects...Bavarian Parliament Recommends the Same
<http://omega.twoday.net/stories/3974159/>

Israel - No use in children under 12 years of age

Russia - General limitation; no use under 12 years

France - No long calls, no use under 16, banning of advertising to children under 12, mandatory earphones with all cell phones
<http://www.next-up.org/pdf/FranceNationalLibraryGivesUpWiFi07042008.pdf>

Japan - General limitation under 18 years of age

United Kingdom - General limitation under 12 years of age

Toronto's public health department has recommended children under eight should use a cell phone only in emergencies.

Health warnings for children and the use of WIFI in the classroom have also recently arisen out of Germany.

Advocacy Groups in US (Sites in addition to the sites referred to above.)

<http://emrpolicy.org/>
<http://electromagnetichealth.org>
<http://www.microwavenews.com>
<http://www.momsforsafewireless.org/>

Dr. Andrew Goldsworthy, BSc, PhD and other prominent EMF/RF Researchers

<http://bemri.org/archive/hese-uk/en/heseuk/who.php>

The Birds, Bees and Mankind, Destroying Nature with EMF/RFR

www.kompetenzinitiative.de

Brochure Series download

<http://www.broschuerenreihe.net/international/index.html>

2002 letter from the EPA (Environment Protection Agency) stating the FCC's standards are "thermally based, and do not apply to chronic, non-thermal exposure situations"

http://www.emrnetwork.org/position/noi_response/noi_epa_response.pdf

International Association of Firefighters moratorium of cell tower siting on Fire stations

<http://www.iaff.org/hs/Facts/CellTowerFinal.asp>

Advocacy site for Electrosensitive People

www.electrosensitivity.org

Study bias Report, RFR researcher Dr. Henry Lai, PhD, and Louis Slesin, editor of Microwave News

<http://www.microwavenews.com/RR.html>

**The American Trial Lawyer Fall 2008
Illusion & Escape – The Cell Phone Disease Quagmire. Are We Being Deceived?**

By Dr. George L. Carlo

<http://d.scribd.com/docs/3zkxnbqo25hwwnvgmqm.pdf>

Environmental Working Group Cell Phone Report

<http://www.ewg.org/project/2009cellphone/cellphoneradiation.php>

Supplemental Images

a. Electromagnetic Spectrum -

<http://www.astrosurf.com/luxorion/Radio/spectrum-radiation.png>

b. RFR absorption in adult Vs child - http://www.devradavis.com/topic-cellphones_clip_image002.jpg