

FCC 13-39

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of	)	
	)	
Reassessment of Federal Communications	)	ET Docket No. 13-84
Commission Radiofrequency Exposure Limits and	)	
Policies	)	
	)	
Proposed Changes in the Commission's Rules	)	ET Docket No. 03-137
Regarding Human Exposure to Radiofrequency	)	
Electromagnetic Fields	)	
	)	

To: Office of the Secretary
Federal Communications Commission
Washington, DC 20554

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August 29th, 2013

AFFIDAVIT OF KEVIN KUNZE

State of California

Contra Costa County

I, Kevin Kunze, attest that my statements are true to the best of my knowledge.

Comment round for FCC ET Docket No. 013-84 and ET Docket No. 03-137

1. My name is Kevin Kunze. My address is 1508 Parker Street, Apartment C, Berkeley, California, 94703.
2. I am an Instructional Media Technician and small business owner.
2. For the past three years, I've been interviewing doctors, researchers, and politicians about the potential long-term health effects from cell phones. Below is a transcript from the documentary. If you would like a copy of this film, please just let me know.

Black screen. A cell phone rings. More phones go off, louder. The ringing stops and there is silence.

KEVIN KUNZE (V.O.)

The first cell phone I ever had was one that I shared with my family. We passed it back and forth whenever my brother and I were going out to the high school football games. I used to pretend like I was Zack Morris on *Saved by the Bell*. When I entered high school, I got my first real phone all to myself. Since then I've owned numerous brands, models, and styles. I honestly can't imagine living without my phone and I'm not only one.

Vintage footage of antique mobile phones.

KEVIN KUNZE (V.O.)

Since the 1920's people have had ideas about wireless communication. In the 1970's, handheld mobile phones began to gain notoriety. Forty years later, cell phones have revolutionized how the world stays connected. They allow us to

communicate information across the globe faster than ever before. They're powerful computers that fit neatly in our pockets. As cell phones continue to evolve, the number of young users is also increasing. In the United States, one third of eleven year olds own their own phone.

Young children talk on cell phones.

KEVIN KUNZE (V.O.)

I experienced this firsthand when I moved to San Francisco and was surrounded by all of the technology sprouting out of Silicon Valley. I gained a newfound appreciation for technology and began to rely on my cell phone more and more. It became my TV remote, my camera on the go, and I even used it to buzz people into my apartment.

Kunze uses his phone in different scenarios.

KEVIN KUNZE (V.O.)

It wasn't until my last year at college I started to think about the real impact technology could have on our lives. Zack, a friend of mine at school told me a story about his father who had been diagnosed with a brain tumor. Alan Marks' family and doctors attributed the disease to his twenty years of cell phone use. It was the first time I had heard a story about a cell phone harming someone.

The screen flickers with static and a 20/20 news report turns on.

DIANE SAWYER

We are going to be raising new questions about the safety of cell phones. You'll remember there were alarming reports a few years ago about brain cancer.

Static changes the channel to FOX.

SHEPARD SMITH

Every cell phone emits some radiation. Whether it's enough to cause cancer most scientists say is still frankly unknown.

Static changes the channel to Comedy Central.

STEPHEN COLBERT

But cell phone manufacturers are looking out for us folks. They recommend that you hold the device 15mm away from your head which conveniently happens to be the thickness of an Amy's frozen burrito. A quick ten minute call to Nanna and lunch is ready.

KEVIN KUNZE (V.O.)

We all know that Stephen Colbert is funny but was this just another case of truthiness? I was surprised to find online that nearly every cell phone manual includes fine print information about radiation exposure and the safer ways people could use their phone. I even looked in my own iPhone manual and found that I also was warned to "keep [my phone] at least 5/8 inch away from [my] body and only use carrying cases or belt clips that maintain at least 5/8 inch separation." Some manuals such as the Blackberry Torch, go as far to say: "keep the device at least .98 inch from your body (including the abdomen of pregnant women and the lower abdomen of teenagers)."

KEVIN KUNZE (V.O.)

Needing to find out whether cell phones could cause harm, I decided to arrange interviews across the country with the top experts. I met with doctors, researchers, patients, politicians, and the telecommunications industry. I hoped through my interviews, I would finally uncover the the truth about cell phone radiation.

Title card: **MOBILIZE**

KEVIN KUNZE (V.O.)

I started locally and learned that in 2010, San Francisco had passed a Right to Know bill to better inform consumers about the potential risks of radiation and the safer ways people could use their phone. The bill was passed unanimously by the Board of Supervisors and former Mayor Gavin Newsom.

GAVIN NEWSOM

Lt. Governor of California

San Francisco Mayor (2004-2011)

Requiring specific absorption rates, which is basically what's emitted in your cell phone to be made available at point of sale when you purchase a cell phone. I can assure you this is controversial legislation.

DEBBIE RAPHAEL**Director, Dept. of Toxic Substances Control, Cal/EPA****Director, Toxics Reduction, City of San Francisco (1999-2011)**

We had to develop regulations to show how we would actually implement the ordinance: what the stickers would look like, what the material will look like that are given out at the retail site. We got slapped with a lawsuit by the telecom industry. The CTIA is the name of the organization that represents cell phone manufacturers and service providers.

KEVIN KUNZE (V.O.)

The CTIA or the Cellular Telecommunications Internet Association was founded in 1984 and is a powerful, multi-billion dollar, trade organization, which lobbies for major cell phone manufacturers and service providers.

A spinning rolodex shows the CTIA board members

KEVIN KUNZE (V.O.)

Their officers and board of directors includes Apple, Sprint, Verizon, AT&T, Samsung, Microsoft, Motorola, Ericsson, Nokia, BlackBerry, T-Mobile, LG, and Qualcomm. The CTIA claims that the safety bill is "alarmist" and would cause "consumer confusion" and "widespread panic." They argue that requiring these precautionary statements violates their First Amendment rights or their freedom of speech as corporations.

JOHN WALLS**Vice President, CTIA**

We think that their activity is certainly false. It's harmful in that it creates misperceptions and that's why we've taken them to court.

KEVIN KUNZE (V.O.)

In spite of the cell phone companies claims, brain tumor victims picketed the CTIA's conference in San Francisco earning major media attention.

LAWRENCE LESSIG, J.D.**Director, Edmond Safra Center for Ethics, Harvard University**

Framework of First Amendment analysis is that it forbids the government from banning and restricting speech. And in the context of providing more information, indeed just adding a bold

mark to information that's already provided by the technology companies, the government isn't restricting anybody's speech at all. It's just making people aware of information that's out there and giving them the opportunity to judge what to do with that information. And I think that's absolutely a legitimate step for the government to take.

GAVIN NEWSOM

There's a lot of studies around the world, particularly with younger people, people who are pregnant, that there could be some harmful impacts. The industry is paranoid of these and is absolutely vehement that that's nonsense and they have all their data to prove that it's nonsense. I actually got convinced that there was something to this and all I said is 'right to know.' I said, "I don't know if it's true or not but I think people have a right to know what this is."

Headlines about the cell phone safety bill and the lawsuit.

GAVIN NEWSOM

The industry came down hard on us. They actually canceled their conference here in San Francisco. I was running for higher office. Trust me this is not an industry you want to infuriate. I'm a big believer in technology. I'm writing a book about this - technology, social media. And I use my iPhone. I love it and I'm not encouraging you not to or discouraging you. But I just think you have a right to know about this so the question is a good one. And we got a lot of grief. A lot of blowback and I'm still paying a big price for that.

An iPhone notepad types out:

**In June 2010, San Francisco passed cell phone safety legislation.
The bill has not been implemented because of the CTIA's lawsuit.**

EXT. 9TH CIRCUIT COURT - DAY

FADE IN:

**CTIA vs. San Francisco
9th Circuit Court
August, 9th, 2012**

FADE OUT:

VINCE CHHABRIA, J.D.

Deputy City Attorney, San Francisco

Part of the reason it's been two years since San Francisco enacted it's original bill is because the policy makers were very conscientious about listening to reasonable objections from the wireless industry about the content of the materials. And the policy makers responded to the reasonable objections. After the city changed it's disclosure requirements, to address many of those objections, that wasn't enough for the wireless industry and they continued to sue. And you're right that this has been delayed for several years now in light of the fact that there is no reasonable First Amendment argument that this ordinance is unconstitutional, it's inappropriate to have further delay.

INT. SAN FRANCISCO CITY HALL

GERARD KEEGAN

CTIA, Director of Legislative Affairs

While these assertions have gained increased public attention currently no scientific evidence establishes a causal link between wireless device use and cancer or other illnesses.

ERIC MAR

San Francisco Supervisor, District 1

There's a Shoemaker study from the British Journal of Cancer from 2005 showing an 80% risk of acoustic neuroma on the same side of the head as reported phone use was found for people who used cell phones for 10 years or longer. The Sadetzki study from the American Journal of Epidemiology showing a 49% - 58% risk of salivary gland tumors among the highest value users on the side of the head where the phone is used. And lastly the study from 2007 from the Environmental Health Perspectives showing and analyzing 59 peer reviewed publications found that those funded by the industry, I guess your industry, were 10 times less likely to show adverse effects associated with cell phone use compared to those studies funded by public agencies or public health charities and other groups. Could you just respond to those?

GERARD KEEGAN

Sure. First, we don't fund any studies here in the United States. CTIA's not involved in researching anything.

KEVIN KUNZE (V.O.)

Mr. Keegan's statement wasn't exactly true. In 1993, when fewer than 1% of Americans used cell phones, the mobile phone industry faced a serious challenge to its public reputation. David Reynard filed a lawsuit against Motorola claiming that cell phone use had caused or accelerated the growth of his wife Susan's brain tumor. Susan died a month after filing the lawsuit, David spoke out on Larry King Live.

DAVID REYNARD

Well we're suing the carrier. We're suing the manufacturer.

KEVIN KUNZE (V.O.)

The negative publicity generated by the episode caused telecommunication stocks to lose more than 10% of their value and within the next decade, dozens of additional lawsuits would follow. To ease public concern and avoid government pressure, the CTIA, in partnership with the federal government began a \$28 million dollar research program called Wireless Technology Research led by George Carlo. Carlo's job was to produce a body of studies on the human and experimental impacts of cell phones. Carlo had no previous experience with radiation research but had conducted research for Dow Chemical, the Chlorine Chemistry Council, and Philip Morris, which tried to produce a 'safer cigarette.'

KEVIN KUNZE (V.O.)

The Wireless Technology Research studies were primarily funded by the CTIA, the same association that's currently suing over the cell phone safety bill. Carlo's industry-sponsored studies would be over after only six years. Photos of Carlo fishing with then CTIA chief, Tom Wheeler suggest the two got along quite well. However, when Carlo's research began to show biological damage, his relationship with the CTIA turned sour. Documentation shows that Carlo suggested a second run of studies for \$50 million but was denied by the CTIA.

GEORGE CARLO, Ph.D.

When they found that we had findings of genetic damage and increasing the risk of cancer, they cut off our money completely.

KEVIN KUNZE (V.O.)

Shortly thereafter in 2001, Carlo released a book about the industry's suppression of research with journalist Martin Schram entitled Cell Phones: Invisible Hazards in the Wireless Age. To

date Carlo's studies are one of the largest U.S. research efforts ever conducted on cell phones and the potential health effects.

GEORGE CARLO

There are no studies that have been done on people that use mobile phones that provide conclusive evidence of safety. Now the industry spins the science and they put it out there for public consumption as though these studies are evidence of safety. It is scientific fraud.

KEVIN KUNZE

Around the same time Carlo's studies were being defunded, President Bill Clinton and Al Gore passed the Telecommunications Act of 1996, which deregulated the cell phone industry by allowing them to control placement of cell towers regardless of health or environmental concerns. In 2012, the CTIA invited Clinton to deliver the keynote speech at their conference. Other previous CTIA speakers include President George Bush Sr. and Gore. **In 2013, President Obama nominated cell phone lobbyist Tom Wheeler to be the next chairman of the FCC, the organization which regulates the radiation levels for cell phones.**

INT. CETECOM Phone Testing Facility

FADE IN:

**CETECOM
Cell Phone Testing Facility
Milpitas, California**

KEVIN KUNZE (V.O.)

To find out more about the radiation exposure from phones, I arranged an interview at CETECOM, an accredited cell phone testing facility with about 20 years of experience in mobile technologies. CETECOM is a neutral partner of the industry that ensures they meet international safety standards for radiation exposure. They have labs all around the world but I went to their facility in Northern California to have my phone tested.

**HEIKO STREHLOW
Director, Compliance Services, CETECOM**

The Daisy system is a system to scan the radiation, which is emitted from a mobile phone and absorbed by your body or brain. The Daisy system is computer controlled executing first an area scan to determine the so called "hot spot" of radiation.

DEBBIE RAPHAEL

What's interesting about the regulation of cell phones is it's looking at the heat effect so SAR (Specific Absorption Rate) is how much heat is absorbed into the head, into the body. The way they measure the penetration into the head is they take a fake head, a model of a head and they assume that there's an ear that's 10 mm thick. And then they put the cell phone next to the ear so 10 mm away from the head and then they stick a probe inside that fake head and see how much heat is absorbed. So there's some assumptions with that. Number one is that everyone's got the same head size as a 200 lb male and the other is that everyone's ear is 10 mm thick and that you're not pressing your phone squishing it to your ear to get it closer. So those are the assumptions that are made for the head.

DEVRA DAVIS, Ph.D., M.P.H.

Former White House Health Advisor

The specific absorption rate or SAR of phones was first developed almost two decades ago based on the top 10% of military recruits. This Standard Anthropomorphic Mannequin, we call him SAM for short, stood a little more than 6'2, weighed a little more than 220 lbs. His head weighed about 11 lbs. His brain is bigger, his skull is thicker than most of the world's cell phone users today. When my eight month old grandson showed that he was really smart with a phone, I began to get curious about what we knew about cell phones and what I found really concerned me. I learned that other countries, mainly Israel and England, had already issued warnings that children should not even use cell phones. Then I began to do research on this about seven years ago. The brain of a child absorbs twice as much radiation as an adult. That's a stunning fact, few people are aware of it. And we're marketing phones and pushing advertising with E-Trade babies talking into cell phones and children running businesses with little phones as though they're benign devices.

JOEL MOSKOWITZ, Ph.D.

Director, Center for Community Health, UC Berkeley

I don't think SAM and whole the test of the SAR is a good simulation in terms of the typical user today. These tests have been mandated since 1996 with an act that the Federal Communications Commission regulates. The problem with the SAR is that it assumes that there is a thermal mechanism and that there is only a thermal mechanism that can harm you namely heating and yet we know quite well now that the harm being produced by these phones is not due to a heating mechanism.

DEBBIE RAPHAEL

What's been interesting about the science now is that we're learning that there are different ways that the brain might be affected by cell phones beyond heat. There's a new study that just came out showing that the brain cells are stimulated when a cell phone is on. You're not on the phone, the cell phone is just on next to your head. So it's communicating to that cell tower, it's going into your head at the same time and it's causing chemical changes in your brain cells showing some sort of activity. So that's interesting. That's not part of the regulatory process. That's not part of the safety determination at this point in the way the FCC is regulating cell phones.

HUGH TAYLOR, M.D.

Director, Yale Center for Reproductive Biology

Even when you're not talking on the phone, as long as the phone is turned on, it is emitting radiation. It is in constant communication with the tower so you do not have to be talking on the phone 24/7 to have an exposure 24/7. If you're pregnant and walking around with your cell phone in your pocket near your abdomen or in your handbag held next to your abdomen or clipped to your belt you're getting that exposure continuously. Radiation varies with the square of the distance from the object that's emitting the radiation so you move it twice as far away you might have a fourfold reduction in the amount of radiation exposure. It doesn't take a lot of distance to start dramatically reducing your exposure.

STEVE WOZNIAK

Co-Founder, Apple Inc.

Well I'd been into radio and ham radio all my life so I had heard such things about radio phones, ship to shore telephones and these sort of things. Even before we had what we call smartphones, there were phones that were kind of doing a lot of those things. Eventually, phones worked themselves up to the way Blackberrys could do messaging. Then it moved up to where Blackberrys used real cell frequencies and got higher bandwidth and started building in ability to do internet. The radio frequencies in today's cell phones often include GPS (operated on one frequency up to some satellites), cellular (operating to the nearest towers and switching towers and frequencies all the time), Bluetooth is often built in to speak to headsets or your car hands free arrangement, and Wi-Fi so you can tap on to Wi-Fi networks.

STEVE WOZNIAK

Four different radios in one place! Radios tend to interfere with each other. You have to isolate them, you have to test them, you have to find in the laboratory you have to find exactly what compartments, parts, placement. Move something a couple millimeters sometimes fixes a problem. Or put a little metal shield between two pieces. It's a very difficult thing to have two radios in one place. You know one radio's tough to begin with. Two radios they interfere with each other. Three, four! It's a nightmare. And how do you get them inside, so small, with the antennas inside the case.

HEIKO STREHLOW

The system is capable of testing multiple antennas at one time if these antennas are capable to transmit at the same time on the same frequency. The measurements are done frequency dependent, which is of course a limitation by the liquid. We use different liquids for the different frequencies for example different liquids for 850 MHz cellular frequency or 1900 MHz cellular frequencies. The different liquids used for testing are developed by the FCC and corresponding agencies for example ANCE, in order to simulate both head liquid or brain tissue, dielectric properties, and body tissue.

RENEE SHARP, M.S.

Senior Scientist, Environmental Working Group

The liquid that is used in these models. How confident do we feel that this liquid is really truly representing our brain tissues accurately? I think that's a good question.

LELAND YEE, Ph.D.

California State Senator, District 8

As a child psychologist I know that the child's brain is very susceptible to outside influences. It is still developing, it is still maturing.

KEVIN KUNZE (V.O.)

Many companies sell products that encourage babies to play with cell phones including Fisher Price's Apptivity Case. This baby rattle, which can hold an iPhone4, is recommended for toddlers 6 months or older.

LELAND YEE, Ph.D.

We've got to take a more precautionary note. There's good evidence now that indicates the harmful effects of these cell phones to human beings, particularly to children that one ought to be very very careful and cautious about buying and making these kind of toys to young individuals.

HEIKO STREHLOW

Modern antenna device has to compromise for many different scenarios. Phones are held to the head. They can be used body worn so the manufacturers, developers have to accommodate for all these different cases and find the best compromise in order to minimize the impact on the human body and brain but at the same time maintain best connectivity toward the network.

DEBBIE RAPHAEL

For the body, the assumption is that you're wearing the phone in a holster outside your pants. That distance is anywhere from half an inch to an inch away from your body. So if you are using the phone differently than that, if you are putting it in your pocket, which is obviously not a half to an inch away from your body, it's not clear how much you're absorbing compared to the safety factor.

JOEL MOSKOWITZ, Ph.D.

Keeping the phone a reasonable distance away from your body substantially reduces the amount of radiation you're being exposed to. You also have to be aware of where you keep the phone on your body when you're carrying it around, particularly if you're a male, you keep it in your pocket. There's at least eight studies that I've found that have shown evidence of sperm damage.

DAVID CARPENTER, M.D.

Founding Dean, University at Albany School of Public Health

The evidence to date shows clearly that men who have their cell phone in their pocket or on their belt leaving it on for long periods of time suffer reduced sperm count. Nobody has really done this study yet but I will predict that men that wear their cell phone on the on mode on their belt are going to be found to have elevated risks of GI cancer, prostate cancer and other pelvic cancers.

KEVIN KUNZE (V.O.)

According to research conducted in the following nations cell phone radiation was found to damage sperm: the United States,

China, Australia, India, Poland, Japan, Turkey, Hungary, and Greece.

HEIKO STREHLOW

The typical test duration is extremely variable. So for a single scan, that means for one setup the test duration is typically between fifteen and twenty minutes plus setup time.

RENEE SHARP, M.S.

Who uses their cell phone for just 15 minutes over the course of their whole life time? No one. We're talking about very long term exposure; using a cell phone for probably more than 15 minutes every single day for years. When know from about 10 studies that cell phone radiation can damage sperm or decrease sperm count and this is concerning because we also know that there are many countries around the world that are seeing sperm count declines and increases in infertility rates including the U.S., China, many other countries. Now I would never say that these overall declines in sperm count and declines in infertility are caused directly and only by cell phones. It's probably a large number of different factors.

KEVIN KUNZE (V.O.)

Numerous medical experts have issued warnings about cell phones and sperm damage telling users, "[Their] future is in [their] hands." But new research from doctors at Yale has shown pregnant women may also be at risk.

INT. YALE CENTER FOR REPRODUCTIVE BIOLOGY

FADE IN:

Yale Center for Reproductive Biology
New Haven, Connecticut

FADE OUT:

HUGH TAYLOR, M.D.

They had the same environment, the same diet, the same exercise regiment, they were the same genetic background. The only difference between our mice were one group had an inactive cell phone and the other had an active cell phone. We chose to look at the effects on the fetus, the exposure during pregnancy because in the fetus the brain is still developing. It's one of the most fragile and vulnerable times. The cell phones were then removed

at the time of birth and we watched these mice as they developed became adults and what we found were lasting permanent effects in their behavior based on whether they were exposed to cell phones or not.

HUGH TAYLOR, M.D.

The mice that were exposed to cell phones had very different behaviors. These mice were more active. They were in some sense hyperactive. They had decreased memory. They were not able to recognize objects with repeated exposures to the same object. In some sense this resembles attention deficit hyperactivity disorder that we see in children or ADHD. This is a disease that is increasing in the United States and has paralleled the increase in cell phone use. What we find in mice may not necessarily be true for humans but certainly it does show that these biological effects are real and it gives us concern and shows the importance of investigating this further in humans.

An iPhone types out:

WHO Knew

STEPHEN COLBERT

But it turns out that my cell phone may be a hazard to me because the World Health Organization is now warning that cell phone use is quote "possibly carcinogenic to humans." Possibly? Well then I am possibly crapping my pants. Isn't there a simpler way to put this?

World Health Organization Press Recording

CHRISTOPHER WILDE, Ph.D.

I'm pleased to have with me in the IARC studios Dr. Jonathan Samet, Chairperson of the IARC working group.

JONATHAN SAMET, M.D., M.S. U.S. National Cancer Advisory Board

We reviewed all relevant epidemiology studies finding evidence particularly coming from the two largest such studies that wireless phone use was associated with higher risk for glioma, a malignant type of brain cancer, particularly in those who had the most use. These studies were carried out between roughly the major studies 1997 til 2003, 2004. There were a number of

individuals in these studies who had used their phones as long as ten to fifteen years but that is approximately the longest window on which we have observation. So we don't know what may happen as people use their mobile phones longer and longer and presumably and potentially across their full life spans.

STAN GLANTZ, Ph.D.

Director, Center for Tobacco Research and Education, UCSF

The conclusion by IARC that cell phones radiation is a class 2B human carcinogen got a lot of people's attention. I think that the level of seriousness with which this issue was being considered got ratcheted up quite a lot partially because IARC does have a reputation of being so cautious and so hard to convince of anything. I mean if you look at this list of Class 2B carcinogens that IARC has, many of them, things like diesel exhaust, are identified as proven human carcinogens by organizations like the California Environmental Protection Agency. So if you look at environmental toxins broadly, anything that makes it on the IARC list - you know there's very strong evidence of the problem.

DAVID KATZ, M.D., M.P.H.

Director, Yale Prevention Research Center

I think it's important that the World Health Organization has identified cell phone use as a potential cancer risk and I agree with the conclusion. I think what really pertains here is the precautionary principle. The burden of proof is on the industry and on those who want to say there is no risk involved. And the simple reality is that epidemiological data are inconclusive but what they suggest is that there is an unexplained increased incidence of cancer with long term use of cell phones and the cancers tend to occur preferentially on the side of the brain closest to the handheld phone. Of course, the big worry is that children are now using mobile phones extensively and that was never the case before so we're now looking for the first time at lifelong exposure, decades of exposure, and nobody knows what the implications of that might be.

An iPhone types out:

The Interphone study ended in 2004.

**Final results from the study weren't published
until seven years later in 2011.**

DAVID CARPENTER, M.D.

Well the reason was that there were a number of people who were part of that Interphone team who were absolutely adamant that cell phone use had no biological effects. And they refused to accept the evidence that the study demonstrated. While other people on that team felt that the results showed that there was a statistically significant risk and that this risk was real not an artifact of the study design. So they were at loggerheads and could not agree until a new director Christopher Wild was appointed to head the International Agency for Research on Cancer and he basically banged their heads together and said you must publish it. But the agreement was then to hide the significant results in the appendix and to have the headlines and the abstract read as though there was no relationship. I think in my judgement this is simply scientifically unethical.

JACK SIEMIATYCK, Ph.D.

Canadian Interphone Study, IARC Panel Member

My own feeling is that there is no compelling evidence that there is a relationship between cell phone use and brain cancer but there are some pieces of evidence that still point in that direction and that have not been adequately explained.

DAVID CARPENTER, M.D.

Age is important even though the Interphone study did not look at children. The work of Hardell and his colleagues in Sweden suggests that there is a fivefold greater risk of development of brain cancer if you're under the age of twenty when you began to use a cell phone. This is a study by Hardell and Carlberg published in the International Journal of Oncology in 2009. For use of a cell phone if you're under the age of twenty, they report an elevated risk of 7.8 statistically significant for ipsilateral cancer - brain cancer. Whereas if you're between the age of 20 and 49 the risk is 2.1, and if you're over the age of 50 the risk is 1.8. This is clear evidence that younger individuals are more likely to develop a brain tumor. Certainly one wants to have confirmation of reports and not take results from only one study or one particular research group but the evidence is very strong that younger people are more vulnerable to the development of brain cancer as a result of using a cell phone.

JOEL MOSKOWITZ, Ph.D.

And much to my surprise we did indeed find a significant association between tumor risk and mobile phone use and that includes cordless phones as well as cell phones. When you look across the twenty three studies you don't see the effect. However

if you partition the studies based on the research quality of the funding source and they're highly confounded you find two distinctly different patterns of results. And the non-industry funded studies found a consistent pattern of harmful effects and the effects grew stronger when you looked at people who used the phones for ten or more years or you looked for tumors on the side of the head where people reported using their phone the most.

JONATHAN SAMET, M.D., M.P.H.

Here I think it might be reasonable to look for ways to fund research that involve the industry as a partner in identifying ways to provide funds to researchers. There are models for government industry cooperation, the Health Effect Institute for example which supports research on air pollution is strongly funded by the U.S. EPA and the automotive industry. So I think seeking funding models to support research in a peer reviewed vigorous fashion is potentially a good idea.

DAVID CARPENTER, M.D.

It sometimes is easier to get funding from industry but industries, whether it's chemical industries or telecommunications companies, have a point of view - have a conflict of interest. They want results that are consistent with their bottom line. And even if that industry does not interfere directly in interpretation of the results. There is a pressure on the scientist that's doing the study to give the industry what they want because that is going to increase the probability that they could get more funding from that particular industry.

KEVIN KUNZE (talking to Samet)

So based on the IARC announcement a lot of other countries have started to take precaution-

JONATHAN SAMET, M.D., M.P.H.

Let me just check one thing.

Samet unclips his mic and walks out of the room.

An iPhone types out:

\$ELL PHONE

A scene from *Thank You For Smoking* with cell phone lobbyists.

NICK NAYLOR
Is it true?

CELL PHONE LOBBYIST 1
It could be.

CELL PHONE LOBBYIST 2
There are very few cases.

CELL PHONE LOBBYIST 3
It's not scientifically proven.

NICK NAYLOR
Look, gentlemen, practice these words in front of the mirror. Although we are constantly exploring the subject, currently there is no direct evidence that links cell phone usage to brain cancer.

The men breathe a sigh of relief.

CUT TO:

**Senate Committee on Environmental Quality
Sacramento, California**

**JOE SIMITIAN
California State Senator (D-11)**

I guess what I'm having trouble understanding is the argument that you're making which is that there is no issue here because the FCC has clearly chosen to address this as an issue worthy of their consideration. I mean you made the case, and I thought it was an important point, that there was a margin of error essentially fiftyfold. But my point is that if there is a margin of error fiftyfold now we're arguing not about whether there's an issue but about how serious of an issue it is and I think that's an implicit acknowledgment that there is an issue and please feel free to suggest to me where the flaw in my reasoning may lie.

**DANE SNOWDEN
Vice President, CTIA (2005-2011)
FCC Chief, Governmental Affairs (2001-2004)**

Well I think that you're assuming that the phones are getting to a point well above the fiftyfold safety factor, which is never happening. And that is important because how we comply with the FCC's standard based on information here.

Snowden points at some papers on his desk.

JOE SIMITIAN

No let me interrupt and make my comments clearer. Clearly there is a debate going on out there and clearly the fact that there's a debate has been recognized by the FCC then I'm harder pressed to understand the argument, Mr. Snowden.

DANE SNOWDEN

I would disagree with your last statement that there's a debate going on out there particularly among the scientific community and the governmental bodies they're responsible for doing this-

KEVIN KUNZE (V.O.)

It's interesting Mr. Snowden would say this considering his former work experience was with a governmental body responsible for regulating the safety of cell phones. Prior to joining the CTIA, Snowden worked for the Federal Communications Commission as the Chief of Consumer and Governmental Affairs. Then in 2004, he went to work for the CTIA, the organization he was regulating. Snowden left CTIA shortly after this video of him from a hearing was posted online.

DANE SNOWDEN

It tells you that we're not making this up. And I'm going to be very clear. Industry has not said once...once...that cell phones are safe.

DANE SNOWDEN

There's no debate with the FCC. There's no debate with the EPA. There's no debate with the World Health Organization. There's no debate with the National Cancer Institute or the FDA.

JOE SIMITIAN

Well then let me interrupt you again and say tell me why your manufacturers have put this information in their brochures? This is a-

DANE SNOWDEN

To comply with the FCC standards.

Laughter comes from the crowd at the committee hearing.

JOE SIMITIAN

You know candidly what I'm wondering is: is it there in order to avoid liability if and when a problem does arise?

DANE SNOWDEN

There was a big laugh when I said to comply with the FCC's standards but that is why it's there. If you read the OET bulletin it clearly states what we're supposed to say and it gets to even suggested language as to what we should say.

JOE SIMITIAN

Then if it's in your brochure because the FCC told you to put there,
your argument is we don't want the consumer to see the language that the FCC wants them to see.

KEVIN KUNZE (V.O.)

In order to get clear answers, I went to the CTIA's Conference held at the San Diego Convention Center. I met with John Walls, a former Fox Sports Anchor and current spokesperson for the CTIA.

JOHN WALLS

Ummm I don't want to talk about what a federal agency does. That's not- I'm not privy to their processes. I know that there's an interagency working group. A collaborative working group of about ten federal agencies that deal with radio frequency issues. We completely defer to what the science is and the science according to the National Cancer Institute-

JONATHAN SAMET, M.D., M.S.

U.S. National Cancer Advisory Board

The most important bottom line out of it was an increased risk in those in the highest decile, the highest ten percent.

JOHN WALLS

...the American Cancer Society...

OTIS BRAWLEY, M.D.

CMO, American Cancer Society

They consider cell phones a possible cause of brain tumors.

JOHN WALLS

...the World Health organization still...

ALI VELSHI

Journalist, CNN

The World Health Organization has added cell phones to the list of substances that are possible carcinogenic, meaning they might cause cancer.

JOHN WALLS

-the FCC, the FDA. There's a litany of organizations on whose opinion or position we put great credence and we suggest other people do that same.

DAVID CARPENTER, M.D.

To my mind, this is equivalent to people in the Middle Ages saying the Earth is flat because you can't see the horizon. These are not people who have an expertise in health effects and they are simply denying the evidence from multiple sources.

JOHN WALLS

We look to what the agencies say and that is what a well educated and well informed and balanced person would do too.

KEVIN KUNZE

Has the CTIA ever lobbied to these organizations?

JOHN WALLS

Sure. As far as educating them to what we think is appropriate in terms of the relationship or responsibility - San Francisco for example. We had numerous meetings with the city of San Francisco. If you want to call that lobbying or discussion, whatever you want to call it. We have been very clear with that group what our intent is. We haven't hidden behind any - there's no hidden agenda here.

DENNIS KUCINICH

U.S. Congressman (D-OH) (1997-2012)

From the last year on record, the telephone industry and associated communications industries spent close to \$65 million dollars in lobbying. That buys them a pretty loud voice on Capitol Hill. You can call that pressure. You can call that 'an opportunity to inform members about their concerns.'

INT. CTIA CONFERENCE

KEVIN KUNZE

Do you guys lobby financially to any of these organizations or politicians?

JOHN WALLS

No - no. I mean, to say, we make contributions to politicians but I- Nobody has any role in this whatsoever. Not that I'm aware of. But we do go to the FCC. I bet our people, our organization have had 500 meetings with the FCC over the past year on 25 different topics. So the fact that we would ever go to the FCC, if somebody thought that unusual they don't understand what's going on in regard to the give and take in the form relation of policy.

RENEE SHARP, M.S.

So the city of Burlingame in California was having a hearing on their own cell phone ordinance that was going to educate people about the potential effects of cell phone radiation. And what was interesting was that literally the day before or the day of the hearing, the FCC took down the information that they had on their website that addressed what consumers could do to protect themselves from cell phone radiation.

The FCC's site on cell phone radiation before and after the hearing.

MICHAEL BROWNRIGG

Burlingame City Council (2009-2013)

When it comes to the federal government, it would be helpful to have the FDA or one of the health agencies involved with it so one didn't have the feeling that the FCC, which is principally working with industry... It sometimes feels as if the FCC is working against local and state governments.

DENNIS KUCINICH

This is an industry that has a staggering presence in our economy. Over \$408 billion dollars in the last year in sales. Over \$21 billion in profits. Any change in the public awareness or any public apprehension of the issue would cause sales to drop and profits to drop. There's just no question about it. So I think that the industry is very concerned not to participate in any kind of form that would raise questions about safety concerns. So they don't.

An iPhone types out:

In 2008, a Congressional hearing was held on cell phones and the health effects. The CTIA was invited to speak but refused to appear.

Congress footage of Kucinich from September 25th, 2008.

DENNIS KUCINICH

The CTIA, the association of the wireless telecommunications industry declined our invitation to testify. By their refusal, unfortunately they deny this Congress and the public the benefit of their testimony and the opportunity to pose questions and hear answers.

KEVIN KUNZE (V.O.)

Because a national cell phone safety bill wasn't implemented several cities and states across the U.S. began to introduce their own precautionary legislation. To find out more about the east coast bills, I went to Portland, Maine to interview politicians and activists.

The following states turn red on a map: Maine, California, Oregon, Pennsylvania, New York, Connecticut, Wyoming, New Mexico, Hawaii, and Florida.

CUT TO:

Stuart Cobb pours out a plastic bag full of seven cell phones.

Stuart Cobb used a cell phone since age 19.

STUART COBB

Brain Tumor Patient

This is the very first flip phone I ever bought - Motorola. My second flip phone I ever bought.

He was diagnosed was a brain tumor at age 34.

STUART COBB

Then this is the first- Actually, I didn't mind this one because it was a push to talk. Then this is the first kind of smartphone I bought. Then this was my first Blackberry. And this is the last phone I own. Blackberry, a newer one. I think it's 3G or something.

KRISTEN COBB

The company that my husband worked for would supply cell phones for all their employees. When my husband was diagnosed, the day before my daughter's birthday, it was heartbreaking hearing it from the doctor that he had a brain tumor. My heart sank, I felt like I couldn't hear. I became dizzy and I just felt like my whole world just felt like it was crashing. What stuck out the most the day he was diagnosed was his physician asked him a variety of questions and the last two questions were: How often do you use your cell phone? And I'm thinking to myself what an odd question to ask.

NICK MAVODONES

Mayor, Portland, Maine (2010-2011)

I and other neighbors knew Stuart was sick and a very young man with a brain tumor and his doctor felt it could be attributed to his cell phone use and in fact he had a lot of cell phone use since he was a fairly young man. So Stuart brought it to my attention and I offered to sponsor a resolution at our city council making October of 2010, Cell Phone Awareness Month in the city of Portland.

STUART COBB

I had an awake craniotomy. So in other words I was awake through the whole surgery. The recovery was pretty long. I mean after the surgery, I couldn't talk or walk. So I had to relearn how to walk and talk over again. It's just hard being so active during your life and then have everything come crashing down around you. And basically, I've lost my whole career because of this. I've been a hard worker my whole life. This isn't like me - not being able to provide for my family. Currently, I'm on Social Security at age 36.

STUART COBB

I always held it on my right side, right here. The industry should have put warnings on these phones a long time ago.

KRISTEN COBB

We learned that there was a state representative, Andrea Boland, that lived in our state, that actually tried to get warning labels like a month prior I believe. And we were just shocked because we listen to the news, we read the paper and we hadn't a heard. You know I'm like, how could this have happened in our own state and us not know.

ANDREA BOLAND

Maine House of Representatives

Wireless industry has been very powerful in trying to confuse the issue but that's what big industry lobbyist do. They did it was tobacco. They did it was asbestos. The adoption will really I think only come with more media attention and more public outcry.

An iPhone types out:

In 2009, Main Representatives voted no to pass a statewide cell phone safety bill.

MINDY BROWN

Brain Tumor Widow

My name is Mindy Brown, my husband was Dan Brown. He was a defensive coordinator at Fresno State football team. He died March 13th, 2009. Just 18 months ago. I'm here because I'm supporting Mayor Newsom for this bold move that he's making. You guys don't know how much awareness- if anything it's bringing to the nation. People need to know. We didn't know. We didn't know your phone emits radiation. We joked about it. When my husband's ear would get bright red. He'd have to hold his phone out to here on his recruiting calls. He lived on his phone for two decades and it ended up killing him.

She holds up a photograph of his brain tumor.

MINDY BROWN

Here's a statistic, this is my husband. You're looking at him face forward just like you looking at. Here's his ear canal. You hold the phone up, ear canal, tumor.

INT. CALIFORNIA STATE CAPITOL

JOE SIMITIAN

Before we go to witnesses in opposition, Senator Strickland.

TONY STRICKLAND

California State Senator(D-19)

Let me say my heart goes out to the families. And here's one that really caught my eye. And Senator again as you know, we always get conflicting information from different organizations and different research. But this one actually has a chart. And I'm sorry I can share this after. It has a chart of growing cell phone usage among people. Dramatic, right? But then brain tumors is flat lined. So if there's such a dramatic increase in use of cell phones, why is the brain tumor not following. If it's because of the cell phone use, why is the - flatlined and not growing with the amount of cell phone usage. I mean those are the kind of questions and this is the one chart that really caught my eye.

An iPhone types out:

These statistics do not take into account data after 2006.

DAVID SERVAN-SCHREIBER, Ph.D., M.D.

Author, *Anticancer: A New Way of Life*

Realizing that I knew a lot less than I thought I did, I went to the scientific literature on that question and what I found baffled me. First, yes it's true that the vast majority of studies that have looked for a risk of cancer for people using their cell phones didn't find any. But typically they only looked at less than five or six years of cell phone use. Now think about that two seconds. Some of them looked at less than two years of cell phone use. If you had people smoke two packs of cigarettes a day for five or six years, would you see an increase in the risk of lung cancer? Absolutely not. So you look at these studies that have examined less than six years of cell phone use. You take them. You tear them. Throw them. You don't even need to read them. They're irrelevant. Now there's a handful of studies that have looked at ten years or more of cell phone use. Now they're too small and there aren't enough of them so we don't have a definitive answer but these studies all find roughly a doubling of the risk of brain tumors on the side on which people say they have been using their phone. Now this is a signal. It's not a

proof. It's a signal to me that we should be paying more attention to this issue.

JOEL MOSKOWITZ, Ph.D.

We're beginning to see some evidence coming through in the tumor registry data. I think we will see increasing evidence over time. We're not just talking about brain tumors, by the way. There is evidence of other kinds of tumors particularly acoustic neuroma or the nerve going from the brain to the ear. Also, the salivary or parotid gland there's a couple of studies. The country of Israel, for example, has already shown substantial increases in parotid gland tumors in their tumor registry data.

An iPhone types out:

**In Israel, 1 out of 4 parotid gland tumors
is in someone under the age of 20.**

**In 2000, Israelis were the heaviest
cell phone users in the world.**

TONY STRICKLAND

Again going to the chart I understand the but you have dramatic increases 15-20 years ago. You're saying now it's a 30 year window? Because again it goes way back and becomes dramatic 15, 16, 17 years ago and it has flat lined.

The following text fades over his face:

**Tony Strickland received \$87,000 from
interest groups that opposed this bill.**

LAWRENCE LESSIG, J.D.

When research is funded by an interested party and the conclusion correlates with the interested party's views, people wonder is it because of the funding or because of the truth. When a Congressman or a Senator or a state representative receives an extraordinary amount of money from an interested party and then goes out and does things that are consistent with what the interested party does. People wonder is that because the representative thinks that it's in the public interest or thinks that it's in the interest of the interest group that's giving them all the money.

SAM BLAKESLEE**California State Senator (D-15)**

I guess one of my concerns is the degree to which we desensitize people when there are so many things we do want to sensitize people to with regard to what the risks are. Obviously, with a pack of cigarettes we've great lengths and we don't simply... We go to great lengths. We put on the package this will kill you in effect.

BRET BOCOK**Brain Tumor Survivor**

I was an early adaptor. I used a cell phone immediately when it came out. There's a lot of good benefits from a cell phone. It's not like a cigarette where there's no benefit and that's one of the more dangerous things about cell phones. So I used a cell phone from 1988 up until - and I still do use a cell phone but I take precautions. I never put a cell phone up to my head - ever. I text and or use speaker phone and I limit my time to a cell phone. And these are all basic precautions that if I had been told about over the last twenty years I wouldn't have found myself with a brain tumor and put my life in jeopardy. Basically, I think it's my moral and ethical duty to inform other people who are not in the know on the issue as I wasn't for twenty of the years. I'm really lucky to be alive right now after the experiences I've had over the last year which I attribute unequivocally, categorically, for sure to cell phones.

CRISTIN PRISCHMAN**Brain Cancer Widow**

My name's Cristin Prischman. My husband died December of 09. He was 42. He was an avid cell phone user. We lived in LA. He was in the entertainment industry. When we found out we went to Dr. Keith Black at Cedars-Sinai and we asked him how this could happen and he said cell phone. They know it causes brain cancer but what's the harm of letting people know that it does.

STEVE CARLSON**California Government Affairs Counsel, CTIA**

Steve Carlson for CTIA the Wireless Association, the trade industry organization for the wireless industry and handsome manufacturers Apple, Google, Qualcomm, ect. We believe it would be a huge policy mistake even with the bill in the form that it is now. To question the safety, which in fact this does, and which certainly is the intent of the proponents.

SIEGLINDE JOHNSON

California Retailers Association

Many products that we sell come with various warnings on the label or in the users guide. Anything from iron to itch creams, in the retail environment our customers would be extraordinary confused if we had to post each of those warnings at the point of sale and our retail stores would end up looking like a NASCAR driver's suit. And consumers would be confused and possible afraid.

QUALCOMM

Qualcomm believes the only purpose this bill will serve is to create fear and uncertainty amongst consumers and that will eventually just be hurtful to the wireless industry which is really a California based industry.

ROBERT CALAHAN**Director, Government Affairs, TechAmerica**

Robert Calahan was TechAmerica representing 1,200 technology companies nations wide and we are opposed to the bill.

BILL DEVINE**Vice President, AT&T**

Bill Devine with AT&T. We oppose the legislation and I will take the liberty with that one sentence Mr. Chairman. One concern we have is the point Senator Leno just made moments ago and that is this label may stimulate conversation in the retail establishment.

MICHAEL BECKLER

Michael Beckler of Verizon Wireless in opposite to the bill. Thank you Chairman.

ANNE PERKINS**Manager, State Government Affairs, Sprint Nextel**

Anne Perkins with Sprint in opposite to the bill.

SUSAN LIPPER**Senior Manager, Government Affairs, T-Mobile USA**

And Susan Lipper with T-Mobile USA in opposite. Thank you.

INT. MARK LENO OFFICE

MARK LENO

Industry has resisted even the most minimal amount of information being disclosed. Finally we just said in our bill read your owners manual for the safest usage of your phone and they fought that as well. The more they resist the more it makes me wonder: what in fact are they hiding from us?

JOEL MOSKOWITZ, Ph.D.

The cell phone industry seems to be using the playbook of the tobacco industry in fighting any efforts particularly at the local level right now to try to do any kind of information and education or legislation around the use of cell phones. And I think in large part they're doing this to have a chilling effect at the local level. They sue San Francisco then a lot of other communities who are on the verge of adopting a similar law will probably hold back for awhile. There are about a dozen countries now that have adopted precautionary health recommendations with regard to cell phones. So I think the industry is being short sighted trying to play this game saying we have First Amendment rights. I think our system of law had really gone too far in the direction of giving rights to corporations.

INT. BERKELEY CITY HALL

FADE IN:

**Berkeley City Council
Public Forum on Cell Phone Safety**

MAX ANDERSON

Berkeley City Council, District 3

The oppressive boot of finance and money and influence on the legislative process that spills over invariably into the scientific community. I can sight you a number of reports around the issues of asbestos, smoking, and other forms of radiation. So we know what the influence and the power of money and vested interest can do to the welfare and body politics of this country. We have a responsibility to employ those principals that were developed from our life experiences having to do with how people have been bamboozled by bad products with lots of money behind them and congress people and others being bought off to look the other way. We're not looking the other way.

An iPhone types out:

Connecting the Dots

DAVID CARPENTER, M.D.

The responsible thing for the cell phone industry to do would be to provide to researchers access to the data on actual usage. The limitations of the studies to date are the exposure assessment. The cell phone industry has that data of how much time each cell phone is being used. Maybe not if it's shared among people but most cell phones are not. That's the kind of information that would really allow one to do the proper kind of study.

CUT TO:

INT. CTIA CONFERENCE

KEVIN KUNZE

If researchers had access to the call records they might be able to make better assessments about this to either prove or disprove the fact that they might have any association with cancer risk. Are you opposed to this?

JOHN WALLS

Well the federal government doesn't control any call records whatsoever. So I would be highly opposed to that. I think anybody who's a believer in the American system of life wouldn't want the federal government snooping into their-

KEVIN KUNZE

But Homeland Security has access to those records. That's what I'm saying. If Homeland Security has access would you be opposed to giving that same access to researchers just looking at the health effects.

JOHN WALLS

There's no reason to grant that access based on the overwhelming evidence of the scientific pieces of-

KEVIN KUNZE

It's kind of mixed though.

JOHN WALLS

Well we could argue about that.

An iPhone types out:

The U.S. government collects the phone records from billions of cell phone customers.

In 2011, AT&T made \$8.2 million selling call records to U.S. law enforcement.

LAWRENCE LESSIG, J.D.

Everyone's concerned about privacy in the context of access to cell phone records and rightfully so. But there are ways to architect that access so that nobody would have any fear about ever being tied specifically to particular usage patterns and instead those usage patterns can be anonymized so we can begin to understand whether there is some connection.

JOEL MOSKOWITZ, Ph.D.

Obviously we need a whole lot more research on all of these issues, which is one of the really frustrating things. So little research has been done. There's almost no funding for research and I even hear this from my European colleagues, where there's been a fair amount of research, that they've had a very difficult time finding funding outside of the industry to do anything. So we've been quite remiss on doing research on this issue. We've been very resistant to the whole issue as a nation. At least in terms of our governmental health authorities, we seem to be in denial.

DEBBIE RAPHAEL

The Mobi-Kids study is happening now in Europe. What's interesting about that study is twofold. One, that it's focusing on the safety of cell phones for children. The second thing that's interesting is that the U.S. is not participating in that study. I don't understand why that's true.

ROBERT NAGOURNEY, M.D.

Director, Rational Therapeutics

In December of 2009, I first met Donna. She was very healthy, vigorous, athletic. No predisposing factors for cancer. Family history was negative. From everything I could see there was no obvious explanation for this young woman to have breast cancer, particularly multifocal breast cancer. And the only possible association I could identify was she had a habit of always carrying her cell phone under her right brassiere strap. Breast

cancers are characteristically diagnosed in women in their fifties and sixties. The Asian population have a lower incidence overall. Due to Donna's young age, lack of risk factors, multifocal disease, Asian history, normal medical history, with no predisposing factors, I would say that she would be an unusual case.

DONNA JAYNES

Breast Cancer Patient

I don't have any history of breast cancer in my family and I also had the BRCA-1 and BRCA-2 genetic tests conducted on me and it came up negative. So I don't have the genetic mutations for breast cancer. And with each following doctor appointment it seemed as if they kept finding another tumor and another tumor. We connected the dots of where the locations of the tumors were based off the biopsy. We made marks on me of where the location of the tumors were and realized that it formed the shape of the cell phone underneath the footprint of the phone or where I used to keep it.

ROBERT NAGOURNEY, M.D.

The breast tissue in the young child-bearing years menstruating women is a fertile ground for cellular activity, metabolic activity, and arguably cancer causation. Causation in this situation may be difficult to prove. The issue here is that if there is even a small possibility that the thermal or piezoelectric effect or other pulsed electromagnetic field influences could even remotely influence the behavior biology and possible carcinogenicity in this setting, I would urge people to avoid exposure. After all, cancer is wound that will not heal. It's a chronic inflammation that we can not address. And so thermal injury is well established as one of many causative factors in disease and cancer.

JOHN WEST, M.D.

Director, Breast Care & Imaging Center of Orange County

The pattern seemed to be established from what I could see is these women tended to be younger, late thirties, early forties, some up into the late forties, that they had the cell phone in the bra for five to ten years, and the cancer occurred primarily in the upper inner aspect of the breast, which is kind of an unusual place for breast cancers, but all of them had it in the same place except for one. And the final example, the one that had it in her lower breast is even more striking. This is a woman in her late thirties who worked in a cell phone factory where she would check cell phones. They would come across underneath her breasts on a conveyor belt. She checked the phones regularly on

the conveyor belt. They were on and active. And she did this for years and she turned up with breast cancers in the lower aspect of both breasts. Now to have a young woman with mirror image breast cancer in the lower aspects of both breasts pop up sort of out of the blue in somebody with no family history. This is really unusual.

ROBERT NAGOURNEY, M.D.

I would say that would be extraordinary rare. I mean to have mirror multifocal disease in the opposite breasts in similar locations would certainly speak to some form of exposure. These tissues where there's a high degree of estrogen metabolism constituting rich lipid sources partly associated with the production of milk. The water and fat would be very good vibratory substrates for heating which is the mechanism by which microwaves work.

JOSH WOLF, M.J.

Journalist of Year (2006)

If news is a business, the consumer of the news suffers because good business decisions may not be good decisions for spreading information. Anytime you're dealing with some sort of new scientific data that runs afoul of the general common thought there is hesitance to report on it

JONATHAN SAMET, M.D., M.S.

I think the mainstream media make their choices depending on what they want to communicate. They're not, unfortunately, necessarily communicating as public health - for public health purposes they're communicating for media purposes and those may be divergent.

MARK LENO

I was taken by the fact that after a five year international study had been conducted that there was not a single story in the New York Times, the Washington Post, or LA Times. It was as if the story had been blacked out.

FADE TO BLACK:

JOSH WOLF, M.J.

Stories that are critical of cell phones aren't being put on the front page because they'd be going next to a Sprint ad and clearly Sprint has a bias in what they're going to tell you and we need to be much more mindful of who is telling us what they're telling us and why they may be telling us that.

LAWRENCE LESSIG, J.D.

You know it's absolutely clear that cell phone companies use whatever leverage they can to undermine the spread of information that's raising questions about this. Chris Ketcham, when he published his piece in GQ about cell phone radiation. GQ, I was told by former editors of GQ, had to sit on that piece for more than a year as they fought with their editorial and business units about the fact that cell phone companies were threatening to pull all advertising from GQ if they ran this article. So there's no doubt that they're going to use the pressure they can.

An iPhone types out:

**Cell phone companies threatened to withdraw an estimated
\$1 million in advertisements from an issue of GQ.**

**GQ stood strong against the threats
and the article was eventually published.**

GAVIN NEWSOM

What's remarkable is that there was no headline. There was no story about it. It was just lost in the back of an article. Apathy. People are disconnected. They just don't care. They don't believe. And why does that matter? Because that's the foundational principle that makes everything possible. Look special interest on both sides guys. They buy silence. They buy apathy. They buy politicians. In a pessimistic and fearful environment you're going to fight for your patch.

News article with headline: Motorola faces bribery probe.

KEVIN KUNZE (V.O.)

While at Dr. Robert Nagourney's office in Long Beach, I noticed a portrait of John Wayne that was donated to the doctor in recognition of his fight against cancer. Nearly 50 years ago, Wayne starred in cigarette commercials. What would people say about our ads in 50 years?

ROBERT NAGOURNEY, M.D.

Advertising is psychological warfare. I'm not a big defendant of our modern advertising agencies. Celebrities are basically for

sale and if you offer them enough money they'll advertise anything.

A montage of celebrities in cell phone commercials including: Brad Pitt, Cameron Diaz, Jean-Claude Van Damme, Megan Fox, Samuel L. Jackson, Lady Gaga, Beyonce Knowles, Eric Clapton, Mary J. Blige, Jermaine Dupri, Ozzy Osbourne, Justin Bieber, John Malkovich, Zooey Deschanel, Tom Jones, Catherine Zeta Jones, Martin Scorsese, Quentin Tarantino, Wes Anderson, and Leonardo DiCaprio.

A article with the following headline: Leonardo DiCaprio to reportedly earn \$5 million for cell phone ad.

RAFFI CAVOUKIAN
Musician / Author

I've been asked to endorse many products. I've been asked to do commercials and I've never done one in all the years that I've been entertaining children. Out of respect for the child as a whole person. Out of respect for that young audience. In terms of my song "Bananaphone" being used for a commercial, I wouldn't go for it.

INT. RICHARD BRANSON'S LIMO

A black limo drives through a LA street.

October 1999
20/20, ABC News

Richard Branson sits in the backseat of a limo with his cell phone.

RICHARD BRANSON
Founder, Virgin Group

Do not put your phone up to your ear because it could fry your brain. There is the phone, there's the earpiece. And you just keep the phone away from the body and put the earpiece in either ear. And you've got the microphone here, and you can talk. It could be like the early days of cigarette smoking. You know, we just don't know at this stage and since there's quite a big question mark over it, one might as well play it safe.

Branson demonstrates how he uses a cell phone with an earpiece.

KEVIN KUNZE (V.O.)

A month after this interview, in November 1999, Branson founded the cell phone company Virgin Mobile. He launched his company by standing nude in Times Square with a sign saying, "Nothing to hide."

Branson waves and displays a cell phone covering his privates.

KEVIN KUNZE (V.O.)

In 2006, Branson sold Virgin Mobile to the UK phone company NTL for \$1.7 billion. In 2009, Branson sold Virgin Mobile USA to Sprint for \$483 million. While Branson no longer owns a cell phone company, he continues to star in their commercials.

Richard Branson fires a gun at bad guys in an Indian Virgin Mobile ad.

ROBERT NAGOURNEY, M.D.

I think that companies that sell products are probably not overly motivated to provide reasons not to buy them. I would hope and believe that the cell phones companies, if confronted with evidence that there is a risk, would encourage their consuming public to simply use the phones more intelligently. I don't think anyone is calling for a ban on cell phones.

KEVIN KUNZE (V.O.)

I decided to make copies of my cell phone manual to show cell phone representatives at the CTIA conference.

INT. CTIA CONFERENCE

KEVIN KUNZE

The documentary is about cell phones and the health effects and I'm kind of curious to know Sprint's position on this.

SPRINT REPRESENTATIVE #1

Hey I have a gentleman here from...and he is doing a documentary on the effects of cell phones to the human body and wanted to know if Sprint would be willing to speak on camera in regards to

what we're doing about the fact that it causes...What? What did you say?

KEVIN KUNZE

Umm just in general the health effects of cell phones.

SPRINT REPRESENTATIVE #1

So I told him you needed to speak with someone in PR media. You'll send somebody right now. You can? Okay I'll send him to the lounge. Okay I'll bring him down there. Okay bye.

Kevin is taken to a tented off section of the conference.

KEVIN KUNZE

Many cell phone manuals come with a warning about keeping it about an inch away from the body.

SPRINT REPRESENTATIVE #2

Yea.. Um... We don't really have anybody here who can speak on this topic today at the show so I don't know if maybe there's a follow up that we could do separately.

KEVIN KUNZE

Definitely.

SPRINT REPRESENTATIVE #2

We can check into that.

Security escorts Kunze out of the Sprint media lounge. The following text fades in: **Sprint did not follow up for an interview.**

INT. VERIZON BOOTH

KEVIN KUNZE

I'm interested to speak with someone in PR. Would you speak with me?

VERIZON REPRESENTATIVE

I'm the PR guy.

KEVIN KUNZE

I'm interested to know...Is it okay I'm recording?

VERIZON REPRESENTATIVE

Well what do you want to know and then I can put you to the right person.

INT. SAMSUNG MOBILE BOOTH

KEVIN KUNZE

Is it okay if I record?

SAMSUNG MOBILE REPRESENTATIVE #1

Umm actually. Oh you're media! Oh yes! It's okay but I'm not a spokesperson so...

KEVIN KUNZE

I understand. I'm interested to speak with someone that would be a spokesperson.

SAMSUNG MOBILE REPRESENTATIVE #1

Let me get you to somebody. Just one second.

Kevin is introduced to another Samsung Mobile representative.

KEVIN KUNZE

Basically in all the cell phone manuals in fine print it says to keep about an inch away from the body and they also offer ways that people can reduce their exposure by using wired earpieces and things like that.

SAMSUNG MOBILE REPRESENTATIVE #2

Oh okay. I don't have a spokesperson right now to comment on that.

KEVIN KUNZE

Can I just speak with you a little bit about it?

SAMSUNG MOBILE REPRESENTATIVE #2

No I'm not an on camera spokesperson.

KEVIN KUNZE

Can I give you some information about it and maybe we can organize something with the spokesperson?

SAMSUNG MOBILE REPRESENTATIVE #2

Ok yeah. He'll be on the show floor later. If you want to come back by this afternoon.

KEVIN KUNZE

Yeah just let me know a time and I would definitely love to speak with them.

SAMSUNG MOBILE REPRESENTATIVE #2

You know I'll have to double check and see umm but let me. What's the best way to get in touch with you? Do you want to come back by maybe this afternoon?

KEVIN KUNZE

Sure what time would be best to stop back?

The representative pants heavily.

SAMSUNG MOBILE REPRESENTATIVE #2

See that I'm not sure about right now.

The following text fades in:

**The CTIA warned us to stop filming
companies at their conference.**

Kunze interviews John Walls in front of a giant CTIA logo.

KEVIN KUNZE

So I'm kind of curious to know a little bit more about the fact that this is a conference that used to be in San Francisco and you guys pulled this conference from San Francisco. I want to know was this because of the fact that they tried to pass a law that would provide more safety?

JOHN WALLS

Sure, sure. Well first off just for the record we had a contract with San Francisco that we honored and fulfilled that. And didn't have a contract to go anywhere for this year and so it was after that show last year we took open bidding. We've been here in San Diego in the past so this was nothing new to come here but frankly and we've made no bones about it some of our decision was about what the city did. What we thought was irresponsible and in some cases alarmist with the kind of materials and the kind of representation of the facts we think they're playing with right now and that's why we've filed suit against them in court. So we're challenging them based on the First Amendment of the U.S. constitution and we think we're on pretty good ground and they've gone way out of bounds.

STAN GLANTZ, Ph.D.

There's no way to get rid of the tobacco problem without getting rid of the tobacco industry. You could make much safer cell phones without really hurting the telecommunications industry. It might make the phones a little less profitable but you could make changes to the way the phones are designed and the way use is promoted that would substantially reduce the risks.

JOHN WALLS

Science tells us that these devices are safe and that is what we therefore really ground our position on.

KEVIN KUNZE

Could they be safer though?

JOHN WALLS

I think, I mean-

CTIA REPRESENTATIVE (O.S.)

No, that was the last one.

KEVIN KUNZE

OK, alright. Well thank you very much.

Kunze walks down an escalator.

DEVRA DAVIS, M.P.H., Ph.D.

I think this problem is far too big for the government. This a problem where the private sector is already stepping up to the plate by making phones that are lower powered and turn themselves off automatically. Steve Jobs apparently didn't want to have an off switch on an iPhone because it would be death. Ironical isn't it. All you need is an off switch so we can turn them on and off whenever we want to do so. That would be a great way of reducing your exposure.

An iPhone types out:

Call to Action

Gavin Newsom tests out the new Google Glasses cell phone.

KEVIN KUNZE (V.O.)

No one knows what the future holds for cell phones. Expensive new inventions worn on the face could push the boundaries of communication but also might come with an even greater cost.

DAVID CARPENTER, M.D.

Are we facing...are we going to face an epidemic of brain tumors in the coming years because of this enormous expansion of use of cell phones, of wireless technology. Everyone is exposed, whether you use a cell phone or not. You can't go into a McDonalds or a Starbucks without being in a wireless environment. Most of us have wireless in our homes and offices. We live near cell towers. Smart meters are being installed everywhere. Almost all of these give much lower levels of exposure than holding a cell phone to your head, they all emit the same kinds of frequencies and like any other toxic exposure, it is almost certain that the adverse health effects are a function of both duration of exposure and intensity.

MITCHEL BERGER, M.D.

President, American Association of Neurological Surgeons

I think it's definitely out there. Everybody is aware of the fact that it's controversial. And I think it's only going to take more time, more research, more follow up on individuals who've used a device to see if it is harmful. Absolutely we need to do more research on it and more population based studies to see whether or not there is a deleterious effect or not.

ALI VELSHI

It is a growth opportunity. A whole new industry can spring up around technology designed to keep our phones a safe distance from our heads or our hearts or our reproductive organs. Imagine all the new headsets and the radiation proof cases that can be sold.

DAVID SERVAN-SCHREIBER, M.D.

And that we and certainly people like me with brain tumors should learn how to use a cell phone with precaution. You know cars kill people, right? Motor vehicle accidents kill people all the time. Do we stop using cars? No. We're not going to stop using cell phones either...even if they are dangerous. But we use our cars in a way that reduces risk. Well we can learn to use our cell phones in a way that reduces risk.

KEVIN KUNZE (V.O.)

While we may have to wait for more research, legislation, and media coverage, the power of stardom still exists. Many celebrities have begun advocating for safer cell phone usage, and their endorsement has helped to spread awareness.

Montage of celebrities with retro phones including: Lenny Kravitz, Daniel Craig, and 2 Chainz.

CUT TO:

INT. ANDERSON COOPER SHOW

ADAM LEVINE

And the coolest thing you gave me. I can't lie-

Adam takes out a black retro phone.

ANDERSON COOPER

I'm obsessed with it.

ADAM LEVINE

Is this thing, which is like a phone but it's not a phone, you plug it into your cell phone.

CUT TO:

EVA LONGORIA

And it's great because it keeps the phone away from your face.

ANDERSON COOPER

Right but it's also very satisfying to talk to.

EVA LONGORIA

Yea-

ANDERSON COOPER

Cause you feel you could-

EVA LONGORIA

Shut up Anderson! Can you do that?

Eva holds out the phone. Anderson and the crowd chuckles.

CUT TO:

ANDERSON COOPER

So you're not actually putting the thing up to your head. So it's like you're talking on a real phone.

JANET JACKSON

Oh cool. Is this for me?

ANDERSON COOPER

Yea you can keep that one and since it's our 100th show, everyone in the audience is going home with the same phone!

The crowd claps and cheers.

CUT TO:

STEVE AOKI

Music Producer / DJ

CEO, Dim Mak Records

I became more informed and I think in general the public just needs to be more informed because we all have cell phones. This is a cell phone culture. Everyone uses a cell phone like this. For me, I always have a headset. Always. Or I use speaker phone.

JOEL MOSKOWITZ, Ph.D.

It's really pretty easy to protect yourself from cell phone radiation. Just keep the phone away from your body whenever it's turned on. When you're making a call use a wired earpiece, your speaker phone, or text. And if you keep the phone in your pocket but sure it's turned off and just periodically check your messages.

KEVIN KUNZE (V.O.)

Cell phones are not going away. They will only continue to play a bigger role because they make our lives better. But along with these new advances, it's our responsibility to educate ourselves on how to use phones safer. And only when we get connected with the facts can we regain some control and protect our loved ones. It's time for our voices to be heard. If cell phones aren't going to come with warnings labels, then we need to warn each other.

FADE OUT:

FADE IN:

FADE OUT:

FADE IN:

President Obama nominated CTIA lobbyist Tom Wheeler to be the Chairman of the FCC. Wheeler raised \$700,000 for Obama's presidential campaigns.

FADE OUT

FADE IN:

**Richard Branson continues to make cell phone ads.
Although he doesn't use them next to his head.**

FADE OUT

FADE IN:

**San Francisco's Board of Supervisors settled with the CTIA to
abandon it's cell phone safety legislation.**

FADE OUT

FADE IN:

In March 2013, the FCC released a report reassessing radiation policies. The FCC invites comments to be submitted over the next six months.

FADE OUT:

FADE IN:

There are over 688,000 people in the U.S. living with a primary brain tumor.

Brain tumors are the second leading cause of cancer-related deaths in people under 20 years of age.

The U.S. wireless industry is valued at almost \$200 billion.

FADE OUT:

FADE IN:

Take Action and #Mobilize

Learn More at
Mobilize Movie.com

FADE OUT:

FADE IN:

THE INTERVIEWEES

CUT TO:

GAVIN NEWSOM

Lt. Governor of California

And I like to think San Francisco has always been a city as they say of dreamers, doers, entrepreneurs, innovators, always on the leading cutting edge.

VINCE CHHABRIA, J.D.

Deputy City Attorney, San Francisco

If they receive this information, of course they're still going to use their cell phones. We don't want them to stop using their cell phones but they're going to use their cell phones in a different and safer way.

DEBBIE RAPHAEL

Director, Dept. of Toxic Substances Control, Cal/EPA

There's this movement in marketing circles to use cell phones younger and younger.

DENNIS KUCINICH

U.S. Congressman (D-OH) (1997-2012)

I personally would be very careful about letting any child use a cell phone.

RAFFI CAVOUKIAN

Musician / Author

Corporate social responsibility has to come into play.

GERARD KEEGAN

CTIA, Director of Legislative Affairs

It puts cell phones on par with coffee and pickled vegetables. Now-

ERIC MAR

San Francisco Supervisor, District 1

But children don't put pickles and coffee next to their head or their salivary gland tumors that the studies are showing so I think there's a bit of a difference there.

MAX ANDERSON

Berkeley City Council, District 3

Vegetables! You know, come on! Are you talking to children here? You're not!

JOSH WOLF, M.J.

Journalist of Year (2006)

Commercial interest will shape the flow of information.

ANDREA BOLAND

Maine House of Representatives

They don't do their research. If they did the evidence is there and has been there for decades.

JOEL MOSKOWITZ, Ph.D.

Director, Center for Community Health, UC Berkeley

I think there is a lot of denial at the individual level. People don't want to know that these devices are harmful because they've become highly dependant on them.

JOHN WALLS

Vice President, CTIA

We knew with whom we have to work whether it's Congress on a given issue or the FCC or administration or state.

GEORGE CARLO, Ph.D.

Chairman, WTR (1993 - 1999)

In effect, this industry is regulating itself.

HEIKO STREHLOW

Director, Compliance Services, CETECOM

The mobile manufacturers are trying to avoid additional testing.

DEVRA DAVIS, Ph.D., M.P.H.

Former White House Health Advisor

And there's no basis for standards for teenager or for children or for that matter pregnant women.

KEVIN KUNZE (O.S.)

Have there been other studies conducted in the United States on cell phone radiation and pregnancy?

HUGH TAYLOR, M.D.

Director, Yale Center for Reproductive Biology

Let's see...Not that I know of.

DAVID CARPENTER, M.D.

Founding Dean, University at Albany School of Public Health

Given all the evidence we have for adverse health effects from radio frequency radiation, to have the federal agency that regulates not even have the remotest expertise.

STEVE WOZNIAK
Co-Founder, Apple Inc.

I like his. His card is really cool. I did some plastic ones that didn't turn out good. They were kind of like too thick and this one's really nice.

RENEE SHARP, M.S.
Senior Scientist, Environmental Working Group

I think we're going to be fighting about this for a long time.

LELAND YEE, Ph.D.
California State Senator, District 8

Tremendous lobbying efforts that go on to try to persuade members to not support Senator Leno's legislation.

MARK LENO
California State Senator, District 3

As soon as we can get publicly financed campaigns in place we'll see a significant shift to people power.

STAN GLANTZ, Ph.D.
Director, Center for Tobacco Research and Education, UCSF
One of the big difference between cell phones and tobacco is that cell phones are actually useful. I mean the only thing that tobacco does is kill people and make some money for big multinational corporations.

JONATHAN SAMET, M.D., M.S.
U.S. National Cancer Advisory Board
While a study may not show a statistically significant association, that does not mean there is no risk.

DAVID KATZ, M.D., M.P.H.
Director, Yale Prevention Research Center
We don't need to see a massive increase in the rates of brain tumors if you're the one individual who develops a brain tumor that wouldn't have happened if you didn't have this exposure.

STUART COBB

Brain Tumor Survivor

This is the United States where we scrutinize vitamins before we put them out for sale but we can't do premarket testing on phones.

KRISTEN COBB

Why didn't our government in the beginning test against the skin. That's something that needs to be looked at.

MICHAEL BROWNRIGG**Burlingame City Council (2009-2013)**

There was a very serious threat of litigation. We're a small town. We can't afford to be sued and go to court with the cell phone industry.

NICK MAVODONES**Mayor, Portland, Maine (2010-2011)**

When I'm not using my cell phone, instead of keeping it in my pocket or on my hip, I leave it in my briefcase or somewhere in my office.

STEVE AOKI**Music Producer / DJ****CEO, Dim Mak Records**

(wearing headphones)

I'm like this all the time. Plus, when you have this on when you're walking around, people don't really bother you.

ROBERT NAGOURNEY, M.D.**Director, Rational Therapeutics**

I have two boys, ages twelve and fifteen, and they both own cell phones. And they are both instructed to keep their telephones not away from their bodies but turned off during the day.

JOHN WEST, M.D.**Director, Breast Care & Imaging Center of Orange County**

And based on some of our other information it just leads me to believe that we should be cautious.

LAWRENCE LESSIG, J.D.**Director, Edmond Safra Center for Ethics, Harvard University**

The very cell phone companies they're selling a cell phone and telling us that they're us are at the same time telling us we

should hold them an inch from our head. We should wonder what exactly does that mean.

FADE OUT:

FADE IN:

**This film is dedicated to all those who attribute
their cancer to long-term cell phone exposure.**

FADE OUT:

FADE IN:

**Dedicated to the Following Cancer Patients and Their Families
Alan, Ellie, Zachary and Amanda Marks**

Andy Solomon

Bret Bocook

Cristin and Paul Prischman

Dan, Mindy, and Larry Brown

David Servan-Schreiber

Jean and Mark Brooks

Jimmy Gonzalez

Keith Phillips

Kristen and Stuart Cobb

Milton and Abigail Marks

Mindy, Larry and Dan Brown

Steven and Daphne Jasperes

Teresa Gregorio

FADE OUT:

If you've made it this far I hope you strongly consider reevaluating the radiation standards for cell phones.

Respectfully submitted by

Kevin Kunze

1508 Parker Street, Apartment C

Berkeley, California, 94703

August 29th, 2013

Precautionary Principle; Clara de La Torre Comments, Feb. 6, 2013

To: The Federal Communications Commission
RE: Proceeding Numbers 03-137 and 12-357
From: Clara de la Torre, Santa Fe, NM
Dated: February 4th, 2013

Dear Federal Communications Commission members,

The FCC's current safety guidelines pertaining to RF radiation exposure are outdated and do not reflect the large body of internationally accepted scientific evidence showing significant detrimental health effects from RF radiation. Current FCC guidelines pertain only to "thermal effect" and not to the non-thermal effects of this radiation. Likewise, in a statement issued by the Food and Drug Administration (FDA) on November 10, 1993, the FDA stated that "FCC rules do not address the issue of long-term chronic exposure to RF fields." In order to remedy these shortcomings, the documented non-thermal effects of RF radiation and the effects of long-term chronic exposure to RF need to be studied in depth by the FCC, with comprehensive reforms being made to protect the citizens of the United States.

In support of this statement I am submitting the 2012 *BioInitiative Report: A Rational for a Biologically-based Public Exposure Standard for Electromagnetic Radiation* (available at HYPERLINK "<http://www.bioinitiative.org>" www.bioinitiative.org, as the file size was too large to include with this comment filing.) This report reviews thousands of studies of the bioeffects and adverse health effects of non-ionizing radiation—electromagnetic fields including extremely low frequency ELF-EMF and radiofrequency/microwave or RF/EMF fields—and concludes that public exposure guidelines for emissions from cellular antennas, WiFi and other mobile/wireless devices are set too high to protect health.

As the *BioInitiative Report: A Rational for a Biologically-based Public Exposure Standard for Electromagnetic Radiation* is 1,484 pages long and you may not have adequate time to review it, I'd like to list some of the documented non-thermal effects of RF radiation. The following are cited in the references on the website of the International Association of Firefighters (HYPERLINK "<http://www.iaff.org/HS/Facts/CellTowerFinal.asp>" www.iaff.org/HS/Facts/CellTowerFinal.asp):

- increased cell growth of brain cancer cells
- increased single- and double-strand breaks in DNA
- more childhood leukemia amongst children who are exposed to RF
- changes in sleep patterns and REM type sleep
- headaches
- detrimental neurological changes including
 - changes in the blood-brain-barrier
 - changes in cellular morphology (including cell death)
 - changes in neural electrophysiology (EEG)
 - changes in neurotransmitters (which affect motivation and pain perception)
 - metabolic changes
 - cytogenetic effects (which can affect cancer, Alzheimer's, and neurodegenerative diseases)
- decreased memory and attention, with slower reaction times in schoolchildren
- increased blood pressure in healthy men

Other effects reported from studies around the world include an increase in breast cancer rates, malignant melanomas, sleep disorders like insomnia, hormonal effects, male infertility, skin rashes, and increases in the rates of diseases or disorders such as Autism, Alzheimer's, Multiple Sclerosis, and Attention Deficit Hyperactivity Disorder. This list is not inclusive of all of the detrimental health effects that have been documented, rather, it is just a sampling

Studies including the *Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil* (document submitted along with this letter

and also available at HYPERLINK "<http://www.emrsa.co.za/documents/brazilresearch.pdf>" www.emrsa.co.za/documents/brazilresearch.pdf) show a pronounced increase in cancer deaths within 500 meters of a cellular telephone base station. It is for this reason that I believe the 1996 Federal Telecommunications Act, Section 704—which prevents state and local governments from influencing (including opposing or preventing) the siting of telecommunications towers and antennas in communities on health or environmental grounds—is both a gag order and a death sentence for many Americans. When health concerns are disallowed from the public conversation, we have blatant proof that our FCC safety guidelines are failing us.

Even if the negative health effects from RF exposure were just speculation and not a thoroughly documented (and haunting) reality, a reasonable and responsible course of action would be to: Urge precaution in cell tower placement, keeping towers away from densely populated areas including schools & hospitals
Create laws that protect human health in the interim until a thorough study of the highest scientific merit is conducted, and
Err on the side of caution, by assuming the documented health risks may indeed be true.

Therefore, I ask you, the members of the Federal Communication Commission, to study in depth the non-thermal and long-term effects of chronic RF exposure, and to institute comprehensive RF policy reform. The health & life-safety of Americans depends upon it.

Thank you, and with sincerity,

Clara de la Torre
Santa Fe, NM



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Science of the Total Environment

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Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil ☆

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ABSTRACT

BS = cellular antenna Base Station

Pollution caused by the electromagnetic fields (EMFs) of radio frequencies (RF) generated by the telecommunication system is one of the greatest environmental problems of the twentieth century. The purpose of this research was to verify the existence of a spatial correlation between base station (BS) clusters and cases of deaths by neoplasia in the Belo Horizonte municipality, Minas Gerais state, Brazil, from 1996 to 2006 and to measure the human exposure levels to EMF where there is a major concentration of cellular telephone transmitter antennas. A descriptive spatial analysis of the BSs and the cases of death by neoplasia identified in the municipality was performed through an ecological–epidemiological approach, using georeferencing. The database employed in the survey was composed of three data banks: 1. death by neoplasia documented by the Health Municipal Department; 2. BSs documented in ANATEL (“Agência Nacional de Telecomunicações”: ‘Telecommunications National Agency’); and 3. census and demographic city population data obtained from official archives provided by IBGE (“Instituto Brasileiro de Geografia e Estatística”: ‘Brazilian Institute of Geography and Statistics’). The results show that approximately 856 BSs were installed through December 2006. Most (39.60%) of the BSs were located in the “Centro-Sul” (‘Central-Southern’) region of the municipality. Between 1996 and 2006, 7191 deaths by neoplasia occurred and within an area of 500 m from the BS, the mortality rate was 34.76 per 10,000 inhabitants. Outside of this area, a decrease in the number of deaths by neoplasia occurred. The greatest accumulated incidence was 5.83 per 1000 in the Central-Southern region and the lowest incidence was 2.05 per 1000 in the Barreiro region. During the environmental monitoring, the largest accumulated electric field measured was 12.4 V/m and the smallest was 0.4 V/m. The largest density power was 40.78 $\mu\text{W}/\text{cm}^2$, and the smallest was 0.04 $\mu\text{W}/\text{cm}^2$.

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1. Introduction

Mobile phone radio base stations (RBSs) are now found in cities and communities worldwide. They can be found near or even on top of homes, schools, hospitals, daycare centers and offices. In Brazil, the number of mobile phone users is estimated to be over 200 million and there are more than 5 billion users worldwide. In the municipality of Belo Horizonte, the capital of the state of Minas Gerais, there are approximately 1000 base stations (BSs) with 128.77 accesses by

mobile phones per 100 inhabitants and in Brazil, there are 49,979 BSs licensed through April 2011 (ANATEL, 2011).

The non-ionizing electromagnetic radiation from the BSs is of low intensity compared to the current guidelines on human exposure limits. However, its emission is continuous. This raises concerns as to whether the health and well-being of people living or working close to the BSs are at risk (Khurana et al., 2010; Alanko et al., 2008).

The emission of a BS is usually described by its effectively radiated power in watts (W), which describes the total amount of radiation emitted by the antenna of the BS. Their intensity, called the power density, is commonly measured in milliwatts per square centimeter (mW/cm^2) or microwatt per square centimeter ($\mu\text{W}/\text{cm}^2$) and it expresses the power per unit area impinging normally to the external surface of the subject. The *immission* (absorption) of the subject is measured by the specific absorption rate (SAR), which is reported in

☆ All the authors declare that they have no conflicts of interest.

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watts per kilogram of body tissue (W/kg). The SAR reflects the power that is locally absorbed in a certain volume of biological tissue and is proportional to the square of the local magnitude of the electric field intensity. For ethical reasons, the SAR can only be assessed on animal models or inferred from virtual (computational) models of animal or human subjects (Lai, 2000).

Some scientific studies have shown evidence of increased numbers of cancer cases for people living less than 500 m from the BSs (Eger et al., 2004; Wolf and Wolf, 2004; Eger and Jahn, 2010).

In the Belo Horizonte municipality and in many other urbanized cities and communities in Brazil, the mobile phone network is deployed in regions of high demographic density close to homes and on the facades and roofs of public or private buildings. It is also common to have several antennas sharing the same support structure.

This situation motivated the research of Dode (Dode, 2003) in the Belo Horizonte municipality, where a methodology designed to assess the levels of electromagnetic radiation exposure of the dwellers was used, based on the technical specifications of a sample of the installed BSs. Those estimated data were then compared to measured *in situ* data for the same set of BSs. Fig. 1 illustrates the site of a typical BS (Base Station BH 20) in a residential area of the Serra neighborhood, in the Belo Horizonte municipality and Fig. 2 shows its geographical location. Fig. 3 represents the horizontal and vertical radiation patterns per sector of the same BS. This diagram has been obtained from the technical archives documented by the operators in the Secretaria Municipal de Meio Ambiente (Municipal Environmental Department), the official organization of the municipality that is responsible for the environmental licensing of the BSs.

Some studies have shown evidence of general risks to health and specific risks of cancer associated with the physical proximity of the transmitter antennas of the telecommunication network.

One of the first of these studies indicated an association between cancer growth and a residence near a transmitter antenna (Cherry, 1999). Later, Santini et al. (Santini et al., 2002) carried out a qualitative survey of 530 people living within 300 m of a certain BS. Despite the

subjective methodology, the study showed a peak of symptoms occurred at locations in the interval between 50 and 100 m from the BS, which coincided with the typical distances at which the main lobe reached the ground. In another study, also in France, Santini et al. (2003) surveyed dwellers living 300 m from the BS and others who lived farther away and found more complaints about irritability, depressive tendency, memory loss, problems with concentration, dizziness, within 100 m; headache, sleeping disorder, discomfort, skin problem within 200 m; and fatigue within 300 m, among those living closer to the BS and showed more variability in disease occurrence with distance. Again, this study contained some biases because it was subjective and therefore did not result in a conclusion about the relationship between cancer and the amount of radiation exposure.

Navarro et al. (2003) conducted a study of 145 people in Múrcia, Spain, but only included 101 questionnaires in the analysis. Two groups of participants were formed: one that was living within 150 m of the BS and another beyond 150 m. The average measured power density was $1.1 \mu\text{W}/\text{cm}^2$ at locations within 150 m and $0.1 \mu\text{W}/\text{cm}^2$ beyond 150 m. This study also showed that complaints (insomnia, headaches, difficulty in concentration, discomfort) were greater at locations where the power density was higher, inside the 150 m range.

In Poland, Gadzicka (Gadzicka et al., 2006) also used a questionnaire to conduct a neurobehavioral clinical study involving 500 subjects. The most important finding was the incidence of frequent headaches in subjects living less than 150 m from the BS. However, the study was limited because of the lack of information about the technical characteristics of the BS and the measurements of electromagnetic exposure.

Eger et al. (2004) carried out research in the city of Naila, Germany, to examine whether people who live near mobile phone BSs were at any risk of becoming ill with malignant tumors. Their data bank consisted of records of patients from 1994 to 2004. While preserving the privacy of the information, the personal data of almost 1000 subjects were examined. The analysis showed that the number of newly developed cancer cases was significantly higher among those



Fig. 1. BS site BH 20 in a residential area of the Serra neighborhood in Belo Horizonte municipality.

BS	Site BH 20 – Maxitel
Address	1373 Rua do Ouro Street - Bairro Serra neighborhood - Belo Horizonte municipality
Latitude	S 19° 56' 33,7"
Longitude	W 43° 55' 8,7"

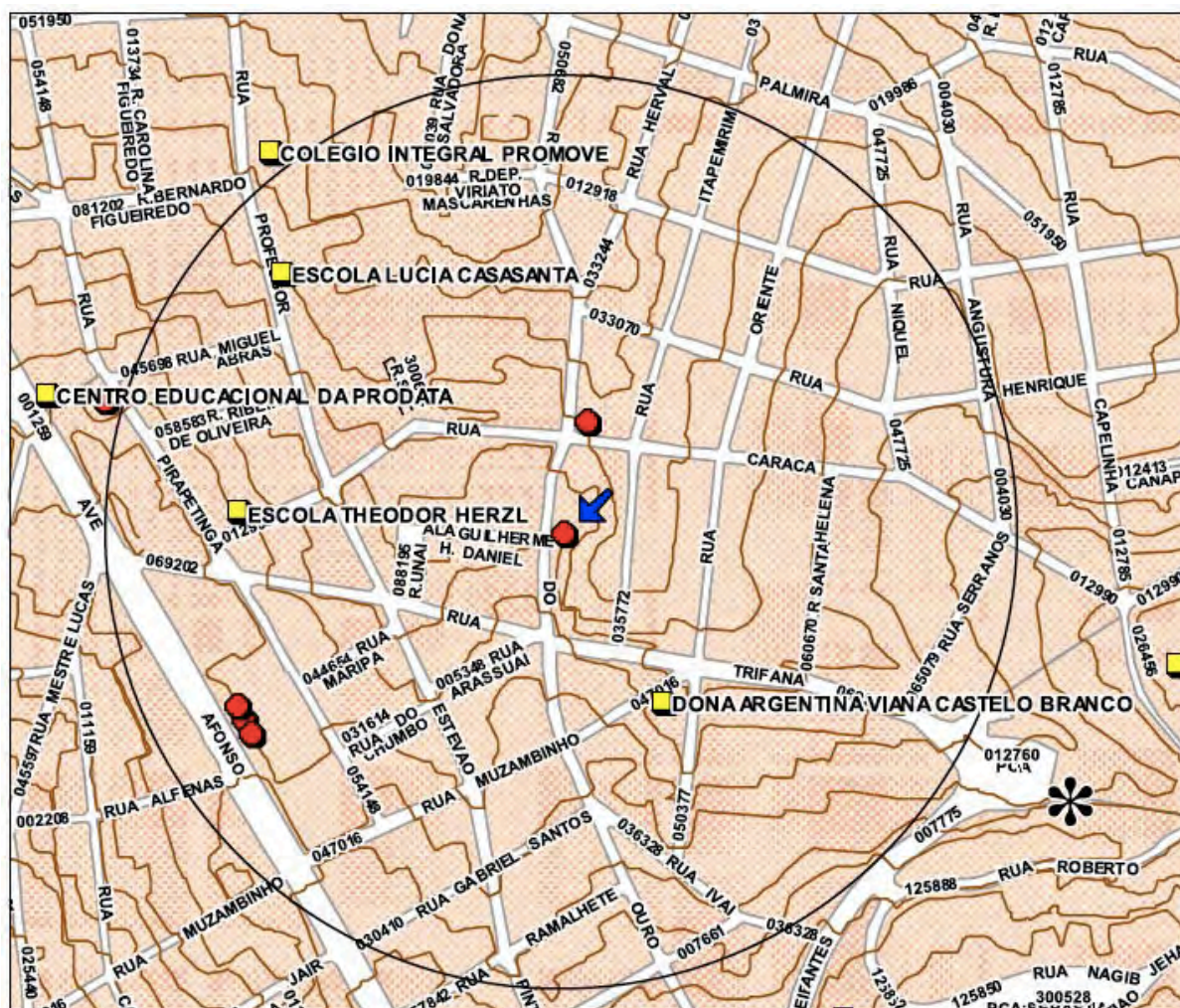
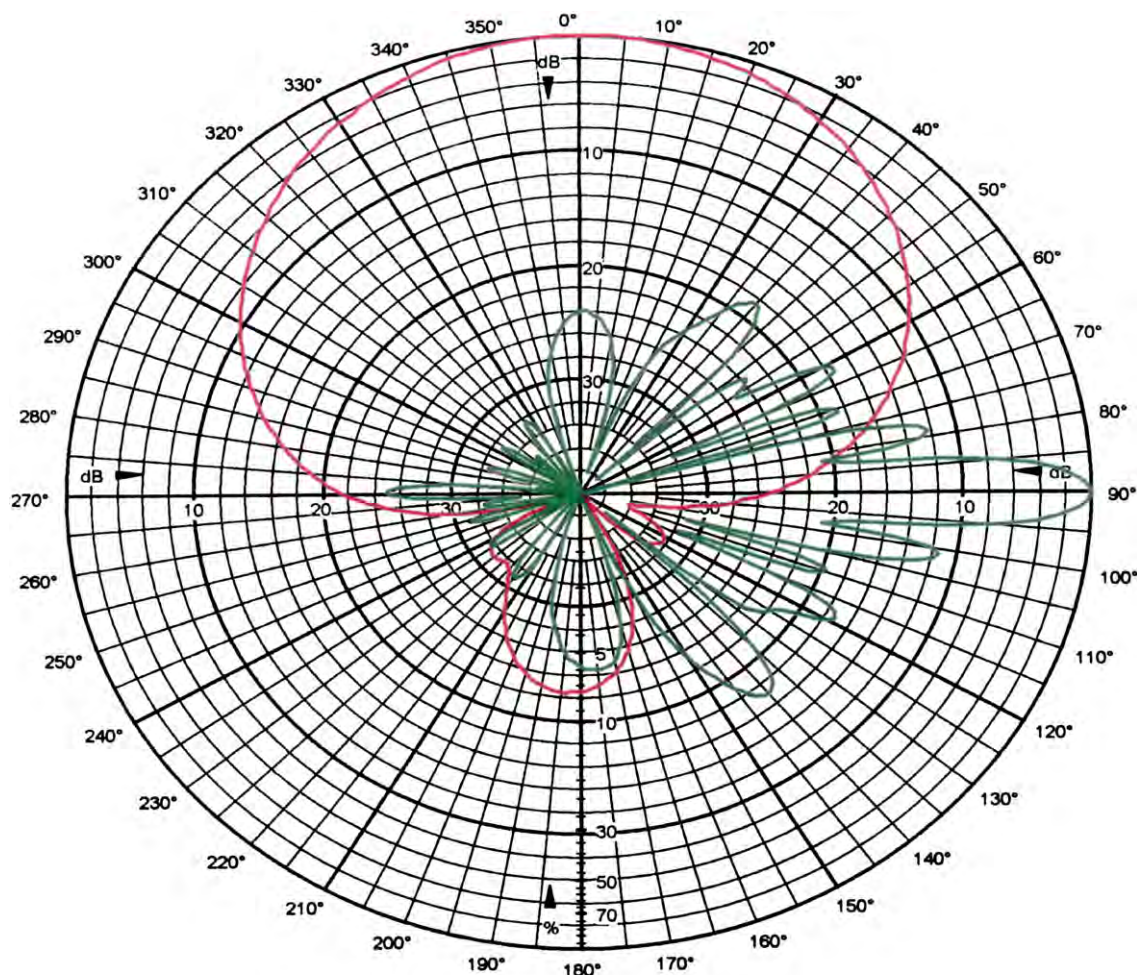


Fig. 2. Geographical location of BS Site BH 20 at 1373 Rua do Ouro Street, in the Serra neighborhood, Belo Horizonte municipality (Dode, 2003).

patients who had lived at distances within 400 m of the BS site, compared to the number of subjects who had lived beyond 400 m in the same period of time. The former subjects became sick eight years earlier, on average, than the latter subjects. The BS came into operation in 1993. From 1999 to 2004, that is, after five years' operation of the transmitting installation, the relative risk of suffering from cancer was three times higher for the subjects living within 400 m of the BS, compared to the dwellers beyond that distance. This study represents a milestone in the field because its results clearly demonstrate that the radiation from the BS may contribute to an increase in the clinical manifestation of the disease and the general development of cancer, even at exposure levels several orders of magnitude lower than the limits of the current guidelines.

Wolf and Wolf (2004) led a study in the town of Netanya, Israel, which showed an increase of 4.15 times in cancer incidence among subjects living within 350 m of the BS, compared to those who had lived

further away. The total number of participants ($n = 622$, group A) were individuals who had lived for a duration of three to seven years near a mobile phone BS and were also patients of a health care clinic. The exposure took place one year before the beginning of the study, when the BS came into operation. A second group of individuals ($n = 1222$, group B), who received medical care in a clinic near the BS and had environmental, socioeconomic and occupational characteristics similar to the first group was used as the control group. In group A, eight types of cancer had been diagnosed within a period of only one year. This rate was compared both to the rate of 31 cases per 10,000 people per year in the general population and the rate of two cases per 1222 people recorded in group B. A 95% confidence interval to each rate was calculated and the rate of cancer occurrence in group A was found to be significantly higher than the rates of group B and the entire population. The relative cancer rate was 10.5 among the exposed women of group A, 0.6 among the women of group B and 1.0 for the entire town of Netanya. Therefore, the cancer



This is the pattern of a sector antenna. You need 4 for 360 degree spread.

KATHREIN	Date 21.06.1995	Horizontal and Vertical Radiation Patterns 870 MHz	Type 737656
	Name		

Fig. 3. Horizontal and vertical radiation patterns per sector of BS site BH 20 (KATHREIN MOBILCOM BRASIL LTDA. HUEMER E. and LENSIG KI-, 1999).

incidence in the women of group A was significantly higher ($p < 0.0001$) than the cancer incidence of group B and the city as a whole. A relative risk comparison revealed that there were approximately 4.15 more cases of cancer in group A than in the population as a whole. The results, although still not conclusive, indicated a necessity to revise the current exposure limits in favor of more protective levels. Both the estimated and measured power densities in the entire exposed area in Netanya were far below $0.53 \mu\text{W}/\text{cm}^2$, that is, approximately 800 times lower than the exposure limit of $425 \mu\text{W}/\text{cm}^2$ for the frequency of 850 MHz from the ICNIRP guidelines.

The aforementioned studies, which aimed to find evidences of an increase in cancer incidence with proximity to mobile phone BSs, warrant additional research, because the cellular phone technology is relatively new and the associated total amount of environmental radiation is far from negligible.

The inhabitants of the Belo Horizonte municipality and the scientific community in general are also concerned about the number

of already installed BSs and the proliferation of new wireless BSs, not only for telephony but also for television. The number of mobile phone BSs, which equaled 474 in 2003, had reached approximately 856 in 2006.

Thus, this research to study health was conducted in a broad environmental context, aiming to verify if there is a spatial correlation between the cellular telephony system BS location and the cases of death by neoplasia during the period between 1996 and 2006.

2. Materials and methods

2.1. Area of study

The Belo Horizonte municipality, with an area of approximately 300 km^2 of area, has a tropical climate and is located at an average altitude of 900 m (minimum of 800 m and maximum of 1200 m)

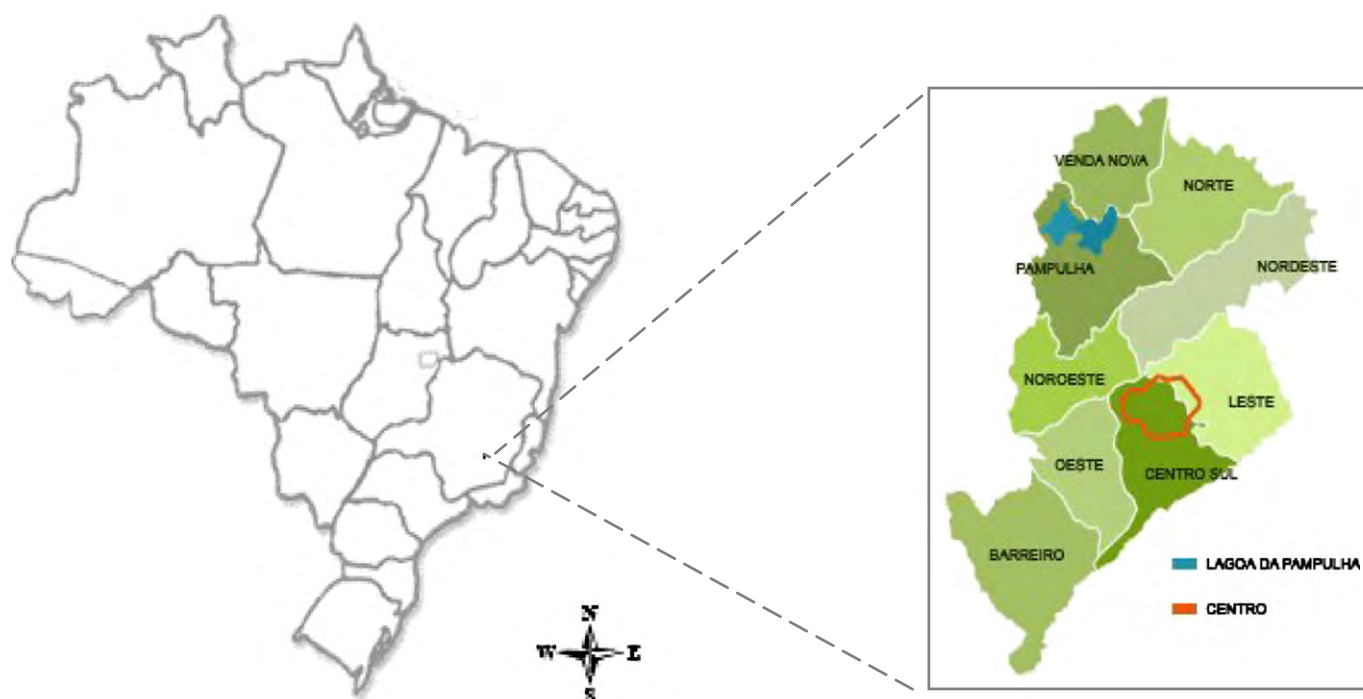


Fig. 4. The Belo Horizonte municipality and the nine SDs.

above sea level. The geology of the city includes several kinds of minerals and its soil of crystalline rocks is composed of dolomite, quartzite, phyllite and various schists. Constructed over many hills, the city is surrounded by a mountain named “Serra do Curral”. The municipality is divided into nine regions or sanitary and administrative districts (SDs): “Centro-Sul” (“Central-Southern”), “Norte” (“Northern”), “Leste” (“Eastern”), “Oeste” (“Western”), “Noroeste” (“Northwestern”), “Nordeste” (“Northeastern”), “Venda Nova”, “Pampulha” and “Barreiro”. Fig. 4 shows the Belo Horizonte municipality and the nine SDs.

The municipality has 55 universities and colleges, 36 hospitals, and a subway system containing 19 stations and 29 km of track, which transports 145,000 passengers a day. The majority of households are served by potable water (99.3%), garbage collection (96.6%), sewage (93.2%), electric power (99.83%), and landline phones (81.43%) (UNDP, 2008) and 128.77 accesses by mobile phones per 100 inhabitants through April 2011 (ANATEL, 2011). With these data, one can conclude that much of the population possesses a cellular phone and more than 28% of the inhabitants have more than one. The city has road and railroad networks that link it to the main centers of the country, as well as three airports.

More than 80% of the municipal economy is focused on commerce, financial services, real estate activities and public administration. The metallurgical industries, including iron and steel metallurgy, and ore mining are located in the areas surrounding the metropolitan region but not in the Central-Southern region.

The city of Belo Horizonte has been selected by the Population Crisis Committee of the United Nations (UN, 2007) as the metropolis with the best quality of life in Latin America and was ranked 45th in the world. Its health system is considered very good, according to the Atlas of Human Development (2000)/United Nations Development Programme (UNDP, 2008).

The city had 2,238,332 inhabitants in 2003 and 2,258,096 in 2010 (IBGE, 2010), which suggests that the population in the city is stable. However, the city, as in any urban area in Brazil, has a concentrated

population, with a large number of people living in apartment buildings. This fact, along with the mountainous landscape, force mobile phone operators to install their BSs at strategic points in the city, mainly on top of towers and poles, as on the terraces of public or residential buildings, to ensure good coverage of the mobile phone network.

Of the nine SDs, the Central-Southern region is the richest region of the city and is the third largest in number of inhabitants with 249,862. There are plenty of commercial and service shops, several shopping centers, and many households with one or more families. This SD also has several hospitals, parks and leisure areas. Most of the dwellers are highly educated and belong to the middle and upper classes. The traffic is heavy because of the large number of vehicles that travel in that region. The Western region is less densely populated, has no skyscrapers and its inhabitants have low revenues. The Barreiro region is the most populated after the Central-Southern SD, and has many industries. The most populated region, with 338,753 inhabitants, is the Northwestern (IBGE, 2000).

2.2. Study design

This ecological study consists of an exploratory spatiotemporal analysis to determine whether there is an association between clusters of BSs and deaths by neoplasia in the Belo Horizonte municipality, in the southeastern part of Brazil. This design was chosen because of the possibility of using geographic areas as units of analysis, where each unit of analysis is composed of a group of individuals or communities. Therefore, it is possible to determine whether there is a correlation between a certain risk and the occurrence of certain grievances within the population. In this type of study, it is not possible to consider individual characteristics, such as food and life habits, activity level, smoking, self-medication, individual pathologies, or genetic factors (GORDIS, 2004).

The analysis was based on the following databases: 1. A database of deaths by neoplasia documented in the Mortality Information

System (SIM: “Sistema de Informação em Mortalidade”), provided by the City Health Department; 2. A database of the site register of BSs, provided by the Brazilian Telecommunications Agency (ANATEL); 3. A database of the city census, including demographic information provided by the Brazilian Institute of Geography and Statistics (IBGE).

The death, BS and population data were geocoded according to census tracts (CTs) or censitarian sectors (CSs), which are “territorial units defined by IBGE (IBGE, 2000) to orient the spatial distribution of a population”. The definition of a CT is related to a specific geographical zone whose population can be counted by local

interviewers, taking into account the existence of geographical barriers, the population size and traffic flow. There were a total of 2563 CTs in the Belo Horizonte municipality (IBGE, 2000).

2.2.1. Cancer death variable

The main outcome that was studied was the number of deaths by neoplasia of Belo Horizonte municipality residents that occurred from 1996 to 2006, were reported to the City Health Department and were routinely confirmed by established criteria, under the responsibility of

Table 1
International classification of diseases – ICD-10.

Disease	ICD-10 – According to WHO ICD10 homepage		Bibliographical references
	Primary	Secondary	
Primary: Malignant melanoma of skin; Other malignant neoplasms of skin./Secondary malignant neoplasm of skin.	C43 and C44	C79.2	Eger et al., 2004.
Primary: Malignant neoplasm of breast./Secondary malignant neoplasm of other specified sites.	C50	C79.8	Eger et al., 2004; Wolf and Wolf, 2004; Bioinitiative Report, 2007; Guenel et al., 1996; Feychting et al., 1997; Wakeford, 2004; Mack et al., 1991; Beall et al., 1996; Benishvili et al., 2005; Hardell and Sage, 2007.
Primary and secondary: Malignant neoplasm without specification of site.	C80	C80	Khurana, 2008; Hardell et al., 2007; Bioinitiative Report, 2007; Mack et al., 1991; Beall et al., 1996; Guenel et al., 1996; Wakeford, 2004.
Primary: Malignant neoplasm of ovary./Secondary malignant neoplasm of ovary.	C56	C79.6	Eger et al., 2004; Wolf and Wolf, 2004
Primary: Hodgkin's Disease/Secondary and unspecified malignant neoplasm of lymph nodes.	C81	C77	Wolf and Wolf, 2004.
Primary: Malignant neoplasm of bronchus and lung./Secondary malignant neoplasm of lung	C34	C78.0	Eger et al., 2004; Wolf and Wolf, 2004
Primary: Malignant neoplasm of kidney, except renal pelvis./Secondary malignant neoplasm of other sites.	C64	C79.0	Wolf and Wolf, 2004.
Primary: Malignant neoplasm of prostate./Secondary malignant neoplasm of other specified sites.	C61	C79.8	Eger et al., 2004.
Primary: Malignant neoplasm of pancreas; Pancreas, unspecified./Secondary malignant neoplasm of other and unspecified digestive organs.	C25 and C25.9	C78.8	Eger et al., 2004.
Primary: Malignant neoplasm of other and ill-defined digestive organs: Intestinal tract, part unspecified; Malignant neoplasm of small intestine; Malignant neoplasm of colon; Malignant neoplasm of rectosigmoid junction./Secondary malignant neoplasm of small intestine; Secondary malignant neoplasm of large intestine and rectum.	C26.0; C17; C18; C19	C78.4; C78.5	Eger et al., 2004.
Primary: Malignant melanoma of skin; Melanoma <i>in situ</i> ./Secondary malignant neoplasm of skin	C43 and D03	C79.2	Eger et al., 2004; Hallberg, 2004; Johansson, 2006.
Primary: Malignant melanoma of skin./Secondary malignant neoplasm of skin.	C43	C79.2	Stang, 2001.
Primary: Malignant neoplasm of kidney, except renal pelvis; Malignant neoplasm of renal pelvis./Secondary malignant neoplasm of kidney and renal pelvis.	C64 and C65	C79.0	Eger et al., 2004.
Primary: Malignant neoplasm of stomach./Secondary malignant neoplasm of other and unspecified digestive organs.	C16	C78.8	Eger et al., 2004.
Primary: Malignant neoplasm of bladder./Secondary malignant neoplasm of bladder and other and unspecified urinary organs.	C67	C79.1	Eger et al., 2004.
Primary: Multiple myeloma and malignant plasma cell neoplasms; Lymphoid leukemia; Myeloid leukaemia; Monocytic leukemia; Other leukemias of specified cell type; Leukemia of unspecified cell type; Other and unspecified malignant neoplasms of lymphoid, haematopoietic and related tissue.	C90; C91; C92; C93; C94; C95 and C96		Eger et al., 2004.
Primary: Hodgkin's disease; Follicular [nodular] non-Hodgkin's lymphoma; Diffuse non-Hodgkin's lymphoma; Peripheral and cutaneous T-cell lymphomas; Other and unspecified types of non-Hodgkin's lymphoma./Secondary and unspecified malignant neoplasm of lymph nodes.	C81; C82; C83; C84 and C85	C77	Hardell et al., 2007.
Primary: Malignant neoplasm of brain./Secondary malignant neoplasm of brain and cerebral meninges.	C71	C79.3	Khurana, 2008; Hardell et al., 2007; Schoemaker et al., 2005.

the epidemiology officers of the city, accredited by federal and local health authorities (BRAZIL, 2011).

All deaths by neoplasia, based on death certificates, were provided. Then, they were re-selected according to a subset of the International Classification of Diseases (ICD) previously organized and extracted from a careful review of the scientific literature, linking cancer and non-ionizing electromagnetic radiation, as can be seen in Table 1.

Out of 22,493 deaths that occurred in the analyzed period (1996 to 2006), 7191 were initially eligible for the study. The selected death by neoplasia cases were grouped according to the CT of the residences, based on the residents' postal address. The data bank of SIM did not possess the address of the persons who died by neoplasia in 1998. So, about 780 deaths that occurred in that year could not be georeferenced. To identify the CT, the cartographic map was used, within the borders delimited by IBGE (IBGE, 2000). Fig. 5 shows the fluxogram of deaths by neoplasia in the period from 1996 to 2006.

The death cases were further analyzed according to age, gender, site of residence and year of occurrence and the death rates were determined as described below. After aggregation of the deaths and BS exposure (explained below) in the CT, differing numbers of deaths were determined, depending on whether the date of first exposure was taken to be the date of the first license of the BS (7191 deaths) or the date of the register of the BS (8082 deaths). We opted to work with the date of first license; an option that makes our analysis even more conservative.

2.2.2. Base stations

The BS database and their respective geographical locations were obtained from the ANATEL database (site: <http://www.anatel.gov.br>) and were further geoprocessed according to their CT in two distinct years: 2003 and 2006. In 2003, there were approximately 474 BSs, and in 2006, there were approximately 856 in the city. Clusters (the so-called “hotspots”) were the identified in each SD. This explanatory analysis was carried out through thematic maps, using the software MAPINFO™, version 7.0, and the Kernel estimator.

2.2.3. Data processing and mapping of the BSs and deaths in the Belo Horizonte municipality

Eligible deaths by neoplasia were then plotted inside circles with radii varying from 100 m to 1000 m, centered at the location of the first transmitter antenna of the mobile phone network to which the resident was possibly exposed. This selection took into account the date of the death and either the date of registration or of the first

license of the given BS. To detect case conglomerates in space, the total amount (2563) of CTs and the corresponding nine DSs of the city were used again. Software was developed to calculate the shortest distance between the death and the antenna and to estimate the time of exposure of the deaths to the radiation of the antennas.

2.2.4. Death rates

The mortality by neoplasia rates per CT were determined from the neoplasia diagnoses in compliance with the ICD-10 during the period of the study, using the CT as defined by IBGE for the 2000 national census as the spatial analysis unit. The deaths in every CT were used as the numerator. The temporal unit was the calendar year. The death data were then georeferenced to the address of the subject's and the IBGE census data (IBGE, 2000) for each CT. The estimated population at risk was used as the denominator.

The accumulated incidence in the Belo Horizonte municipality was calculated by dividing the total amount of deaths in each region by region's entire population.

2.2.5. Estimates of the mortality rates according to distance and duration of exposure to the radiation of the BSs

To understand the spatiotemporal exposure to the radiation of the BSs, the duration of possible exposure corresponding to each death was estimated, using a proxy to the subject's residential addresses, in terms of the duration of his or her exposure to the first installed transmitter antenna of the mobile phone network. To estimate the number of days of exposure, the elapsed time period from the date of installation of the first antenna to the date of the death was calculated, in spite of the exposure to the radiation of other antennas that might have been installed afterward. Some subjects may have been exposed to many antennas at different times, but in this study we considered only the date of installation of the first antenna. The delimitation of the distance intervals of the BSs was then performed. Each interval with a radius of 100 m had a BS as its center, from which the distance was increased to 1000 m. For each 100-meter interval, the deaths that occurred within the elapsed period of time, as well as the estimated population living within that radius, was then observed. To obtain the population at risk, the estimates of all of the CTs were considered, even those which were only partially included within those radii. Therefore, the population at risk was conservatively overestimated.

To estimate the mortality rate within each radius, the number of deaths was divided by the estimated population included in the radius of each CT. For example, for the 100-meter radius, the 3569 deaths were divided by the 821,890 estimated exposed subjects living inside that radius. For the rates between 200 m and 1000 m, both the number of deaths and the included population were cumulatively considered. This was necessary because the subjects included in the 100-meter radius must be considered to perform the calculation inside the 200-meter radius (Fig. 6) (Table 5).

2.3. Environmental monitoring of the electromagnetic field (EMF)

In 2008, one began monitoring the environmental EMF in the CT with the largest concentration of antennas in the Belo Horizonte municipality. The survey used an electric field meter and isotropic probe, with a frequency range of 0.2 MHz to 3.0 GHz; a spectrum analyzer, with a frequency range of 10.0 MHz to 6.0 GHz; a datalogging multimeter; a GPS unit and a laptop. For the field measurements, the following guidelines were observed: IEEE, 1999, 1992; NCRP, 1993; ANATEL Annex to Resolution no. 303 (ANATEL, 2000a, 2000b), and the environmental field survey of two particular nearby BSs, carried out by Dode (Dode, 2003). The analyzed frequencies of the BSs were corresponded to the bands A, B, C and D. During the measurements, stronger electric field intensities were usually found when the probe was far from the ground. Approximately 400 points in the Central-Southern

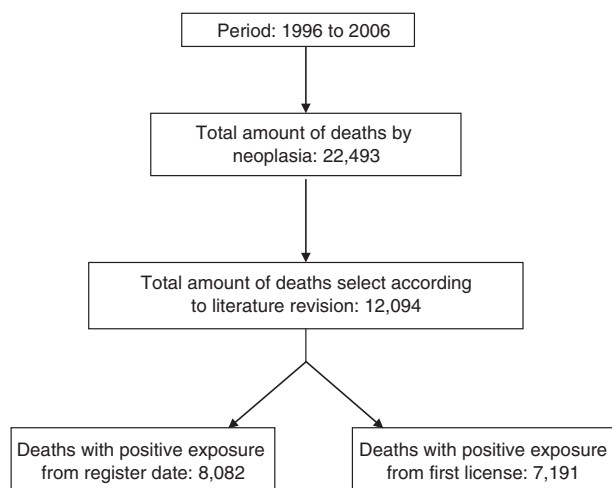
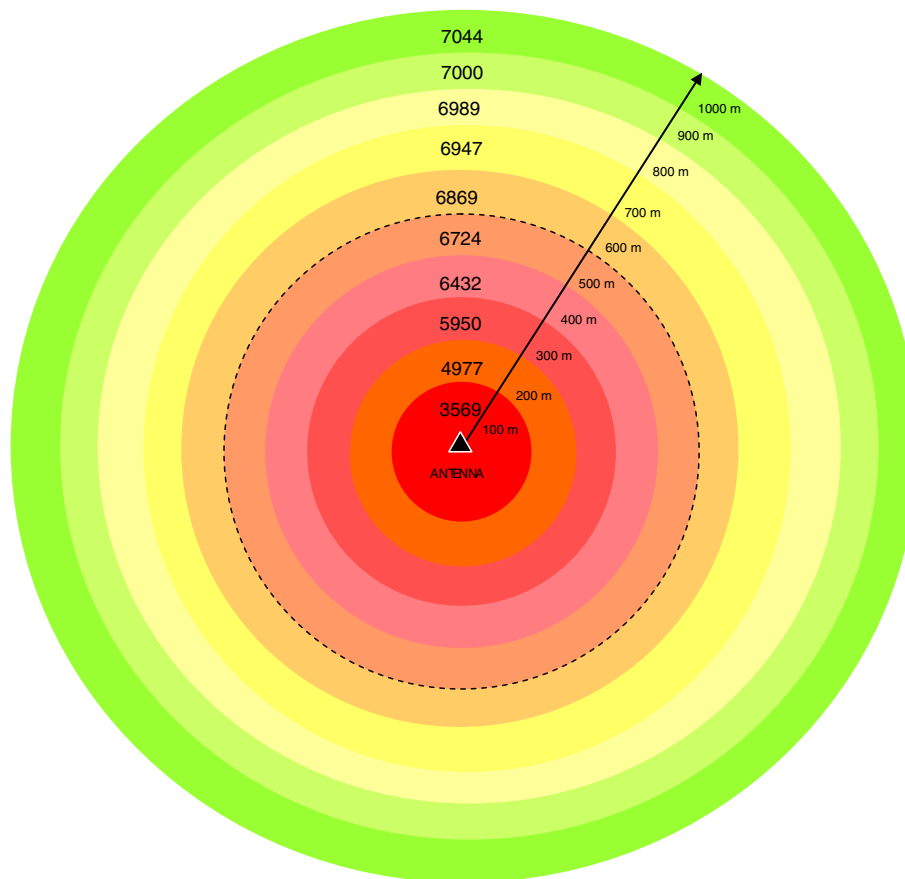


Fig. 5. Fluxogram of deaths by neoplasia in the period from 1996 to 2006.



Within 100 meters = 3,569 deaths

Within 200 meters = 3,569 + 1,408 deaths = 4,977 deaths

Within 300 meters = 4,977 + 973 deaths = 5,950 deaths

Within 400 meters = 5,950 + 482 deaths = 6,432 deaths

Within 500 meters = 6,432 + 292 deaths = 6,724 deaths and so on within 1000 meters

Beyond 1000 meters + 147 deaths

Total amount of = 7,191 deaths

Fig. 6. Total amount of deaths by neoplasia per 100-meter distance band, in census tracts inside a radius of up to 1000 m from the mobile phone transmitter antennas, in the Belo Horizonte municipality, from 1996 to 2006. Total: 7044 deaths.

region of the municipality, which were located in squares, parks, schools and households nearby BSs, were considered in the survey.

2.4. Ethical committees

Because this study includes data on human beings, it was approved by the ethical committees of the Institutional Review Boards of the Federal University of Minas Gerais and the Belo Horizonte City Health Department, with the purpose of accomplishing the Resolution 196/1996 of the Brazilian Health Ministry.

3. Results

3.1. Total deaths by neoplasia selected in the period from 1996 to 2006

Fig. 7 shows the geographic location of the cases of deaths by neoplasia that were confirmed in the literature and selected according to Table 1, totaling 7191 deaths. The detailed geographic description of

deaths location can be seen in Table 2. The Central-Southern SD contained the greatest absolute number of deaths, followed by the Northwestern and Eastern SDs.

3.2. Base station

All registered BSs that were georeferenced through 2006 are plotted in Fig. 8. The percentage of BSs installed through December 2003 was the greatest in the Central-Southern region, comprising 38.60% (182 out of 474); until December 2006, the percentage was approximately 39.60% (338 out of 856). The BS percentage by region in the Belo Horizonte municipality in 2003 and 2006 can be seen in Fig. 9.

3.3. Data processing and mapping of the base stations and deaths in the Belo Horizonte municipality

Fig. 10 portrays a sample of the georeferencing of the BSs and the deaths by neoplasia in downtown Belo Horizonte City located

Table 2

Description of the death coding and geographic location.

Deaths codification	Regions or sanitary districts									Total
	Barreiro	Central-Southern	Eastern	Northeastern	Northwestern	Northern	Western	Pampulha	Venda Nova	
C16	83	143	132	124	183	75	125	57	89	1011
C17	2	3	4	1	3	2	4	4	0	23
C18	1	2	2	2	1	1	3	0	1	13
C19	4	8	13	9	16	2	7	1	5	65
C25	30	155	88	74	137	23	77	42	39	665
C26	4	27	17	12	17	19	23	14	14	147
C34	88	300	194	140	233	89	187	75	99	1405
C43	0	0	0	0	0	0	0	0	1	1
C50	43	210	145	68	177	23	94	35	34	829
C61	42	174	131	84	186	51	122	56	58	904
C64	17	40	28	19	28	16	20	10	11	189
C65	0	1	0	1	0	0	1	0	3	6
C67	18	51	42	28	40	10	30	21	12	252
C71	37	105	54	37	94	23	63	30	28	471
C80	36	86	71	55	83	36	61	21	34	483
C81	5	19	8	4	9	3	9	3	5	65
C83	0	2	0	0	1	0	0	0	0	3
C84	0	0	0	0	0	0	1	0	0	1
C90	11	40	39	21	41	14	33	13	16	228
C91	4	11	6	10	12	3	15	7	7	75
C92	19	62	34	24	43	13	34	14	16	259
C93	0	1	0	0	1	0	0	0	1	3
C94	0	2	0	0	0	0	0	0	0	2
C95	7	17	10	4	18	7	12	4	12	91
Total	451	1459	1018	717	1323	410	921	407	485	7191

in Central-Southern region. A given BS can have three, six, nine, twelve or more antennas, depending on the requirements in the region.

To detect clusters of cases in space, the nine SDs in the Belo Horizonte and their 2563 CTs were used as units of analysis. In Fig. 11, there are CTs with 12, 13, 14 and even 18 deaths.

Table 3

Percentage of deaths by age and gender in Belo Horizonte municipality.

Age	Male	Female	Deaths total	Percentage%
00–04	10	16	26	0.36
05–09	13	10	23	0.32
10–14	12	8	20	0.28
15–19	11	8	19	0.26
20–29	34	34	68	0.95
30–39	80	120	200	2.78
40–49	247	322	569	7.91
50–59	535	559	1,094	15.21
60–69	920	686	1,606	22.33
70–79	1,217	797	2,014	28.00
80–89	708	550	1,258	17.49
90–99	136	158	294	4.08
TOTAL	3,923	3,268	7,191	

Table 4

Accumulated incidence rate of all deaths in the Belo Horizonte municipality.

Regions or sanitary districts	Population	Death number	Accumulated incidence rate/1000
Centro-Sul	249,862	1459	5.83
Leste	251,118	1018	4.05
Noroeste	338,753	1323	3.90
Pampulha	106,330	407	3.82
Oeste	249,059	921	3.69
Nordeste	248,406	717	2.88
Norte	153,821	410	2.66
Venda Nova	198,475	485	2.44
Barreiro	219,873	451	2.05
TOTAL	2,015,697	7191	

3.4. Death rate

The percentage of deaths by neoplasia per year in the Belo Horizonte municipality from 1996 to 2006, considering the start of exposure to be the date of the first license, is shown in Fig. 12. The accumulated incidence rate per 1000 residents for each SD is shown in Table 4. Again the Central-Southern SD presented the highest accumulated incidence rate, i.e., 5.83 incidents per 1000 inhabitants and the lowest rate was 2.05 incidents per 1000 inhabitants in the Barreiro SD.

The same trend was observed for both women and men with similar profiles during the studied years. As expected the incidence of death of women and men was higher in those older than 40, and in this group, the number of deaths was 3923 for men and 3268 for women. After the age of 40, the death rate (7.91%) grew for both sexes, as shown in Table 3. After the age of 60, the rate was even higher (22.33%).

Supplementary Graphics 1 shows the rate of death by neoplasia, according to ICD classification. The most significant causes were malignant neoplasm of bronchus and lung (C34), 19.55%; malignant neoplasm of stomach (C16), 14.05%; malignant neoplasm of prostate

Table 5

Mortality rates by neoplasia in the Belo Horizonte municipality, according to distance from the BS.

Distance (meters)	Deaths total	Population total	Mortality rate/ 10,000	Relative risk
Until 100	3569	821,890	43.42	1.35
Until 200	4977	1,237,368	40.22	1.25
Until 300	5950	1,602,869	37.12	1.15
Until 400	6432	1,796,604	35.80	1.11
Until 500	6724	1,934,032	34.76	1.08
Until 600	6869	2,030,093	33.83	1.05
Until 700	6947	2,055,325	33.80	1.05
Until 800	6989	2,086,712	33.49	1.04
Until 900	7000	2,107,277	33.21	1.03
Until 1000	7044	2,148,327	32.78	1.00
Null hypothesis	7, 191	2,238,332	32.12	1.00

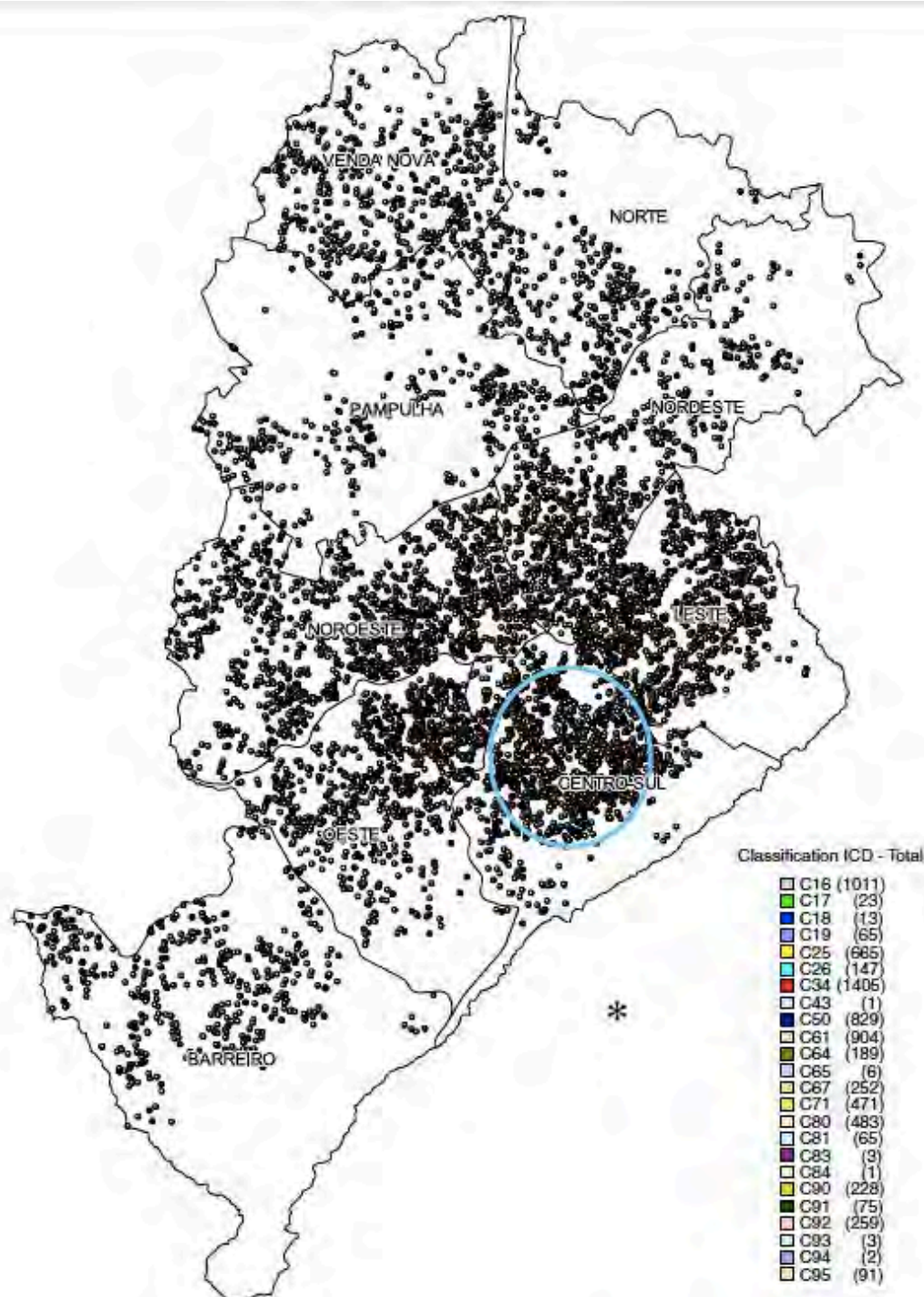


Fig. 7. Map of the total deaths by neoplasia in the Belo Horizonte municipality from 1996 to 2006, classified according to ICD. Total: 7191 deaths.

(C61), 12.57%; and malignant neoplasm of breast (C50), 11.53%. The largest absolute number of deaths was found in the Central-Southern region, followed by the Northwestern region. Also, the highest absolute numbers of lung cancer deaths (300 cases) and breast cancer deaths (210 cases) were found in Central-Southern SD (Table 2). The proportional mortality by gender can be seen in Figs. 13 and 14.

3.5. Estimates of the mortality rates by distance and time of exposure to BS

The mortality rates were estimated by correcting the population mortality by 10,000, according to the radius of distance from the BS within 1000 m. In the region within 100 m, the absolute number of

deaths was 3569 (a percentage of 49.63%), and the mortality rate was 43.42 persons per 10,000 inhabitants. Compared to with the total population mortality rate, the relative risk in this area was 1.35. In the area up to 200 m there was a growth of 1408 deaths, a total of 4977 deaths, a mortality rate of 40.22 persons per 10,000 inhabitants and a relative risk of 1.25 (Table 5). In this way, the estimates of mortality by neoplasia were calculated inside radii up to 1000 m from the BSs. The relative risks presented a decreased dose-response gradient with residents' distance from the first licensed BSs.

Fig. 15 shows the mortality rate by neoplasia according to the distance from the BS in the Belo Horizonte municipality, during the studied period. The accumulated mortality rates by neoplasia,

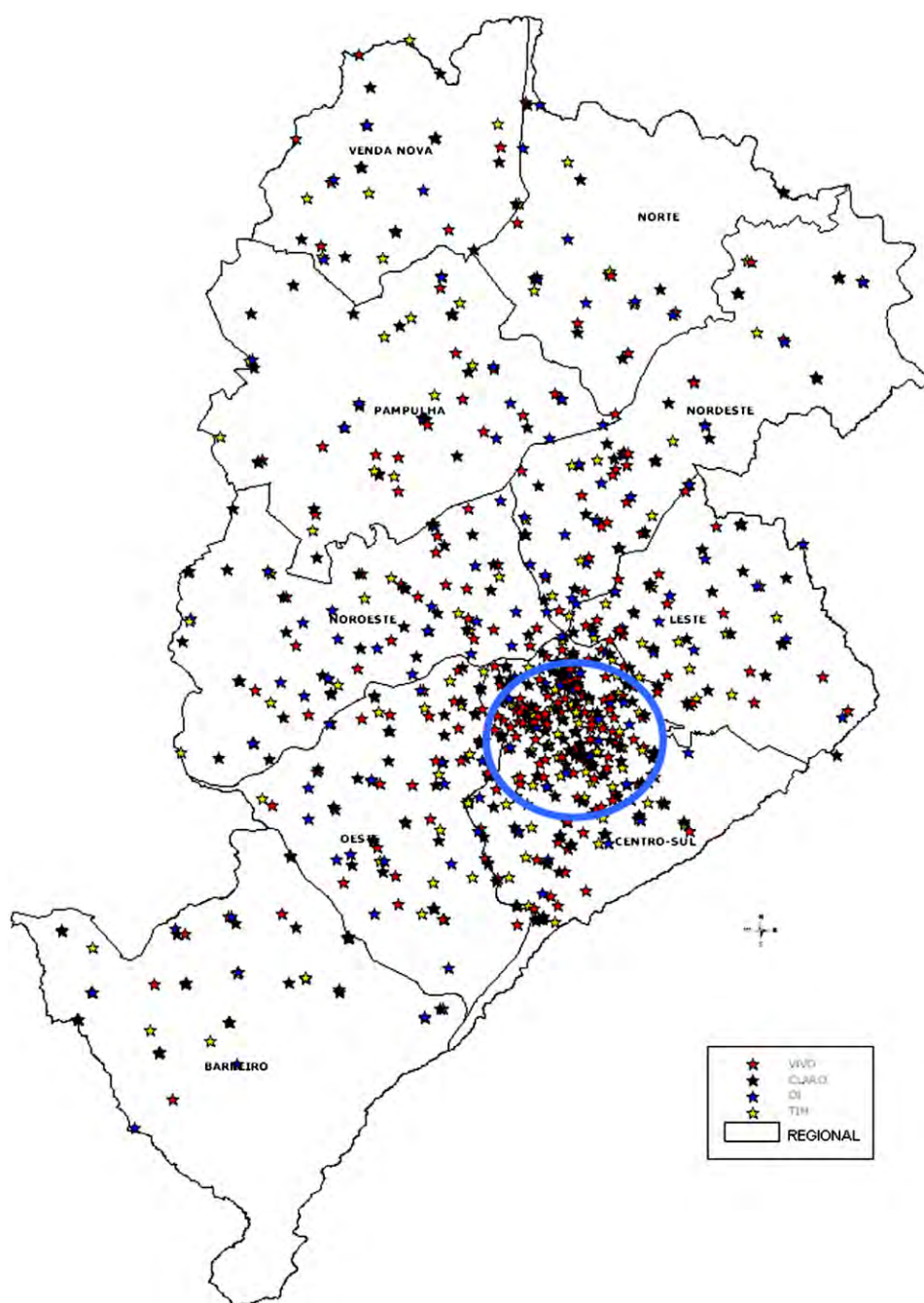


Fig. 8. Installed BSs in the Belo Horizonte municipality until 2006. Total amount = 856.

determined by dividing the total number of deaths during the period ($n = 7191$) by the total population living in the municipality (2,238,332), showed that there was a risk of dying of 32.12 per 10,000 inhabitants, as seen in Fig. 15. In this study, this figure represents the null hypothesis, i.e., the total number of deaths occurring in the period divided by the population, independent of the proximity to the BSs. Fig. 16 shows the distribution of the number of deaths by neoplasia versus duration of exposure since the date of operation of the first antenna in each analyzed CT.

3.6. Environmental monitoring of the electromagnetic field

The EMF results provided essential information for the assessment of risks to the health of the exposed persons in the community. A total of

400 points were measured in the Central-Southern region in 2008, where a major concentration of cellular telephony antennas was found. The mean intensity of the measured electric field was 7.32 V/m, varying from 0.4 to 12.4 V/m. It was common to find a stronger electric field at locations above the ground. The BS frequency bands ranged from approximately 800 MHz to 1800 MHz. In 2003, the power density varied from $0.898 \mu\text{W}/\text{cm}^2$ to $3.066 \mu\text{W}/\text{cm}^2$.

4. Discussion

Electric and EMFs interact with biological systems because they penetrate into organs and tissues, and the biological systems are ruled by delicate bioelectrochemical reactions that sustain the vital processes and receive the influence from those fields. As demonstrated in the literature

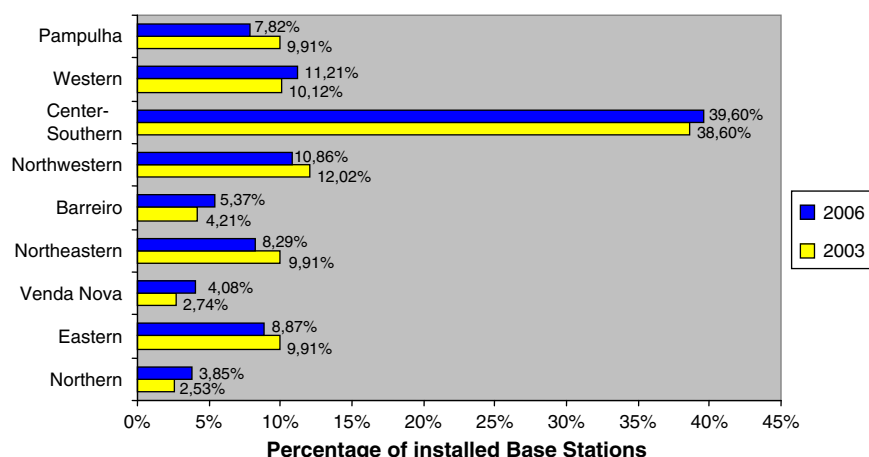


Fig. 9. BS percentage by Sanitary Districts in the Belo Horizonte municipality in 2003 and in 2006.

(Kundi and Hutter, 2009; Sage and Carpenter, 2009; Khurana, 2008; BIOINITIATIVE REPORT, 2007; Cherry, 2006; Cherry, 2007; Hardell and Sage, 2007), exposure to electromagnetic radiation of low intensities for long periods of time is a determinant for the aggravation and the emergence of diseases in humans. Studies point to observations of environmental carcinogens as an alert to the scientific community (Hardell et al., 2007). Bioeffects and adverse health effects occur at frequencies much lower than RF and extremely low frequencies (ELF), without any heating effect.

Khurana et al. (2010) identified by searching PubMed ten epidemiological studies that indicate the occurrence of neurobehavioral effects or cancer. In eight of those studies, the population lived within 500 m of a BS. However, all exposures were under the accepted international guidelines. Therefore, it is suggested that those guidelines may be inadequate in protecting the health of human populations. Additionally, more comprehensive epidemiological studies are necessary to evaluate long-term exposure to RF from mobile phones BSs to understand its health impact.

This research bases on the ecological study that uses geographical areas as units of pre-existing data to identify areas of risk. The data is already aggregated, and one does not know about the genetic characteristics, life habits, food choices and other factors of each individual. The ecological studies frequently begin the epidemiological process, and the discoveries are considered to be an alert.

In the Belo Horizonte municipality, the mortality rate was concentrated near the antennas and was not diffuse over the whole city. At a distance of up to 100 m, the absolute number of deaths was 3569, 49.63% of all deaths, the mortality rate was 43.42 persons per 10,000 and the relative risk was 1.35. When one does not consider the distances from the BSs for all the entire population of the Belo Horizonte municipality (2,238,332 inhabitants), the mortality rate was 32.12 per 10,000 inhabitants, which is the null hypothesis.

In this research, we found a mortality rate for the residents living within 500 m of the transmitter antennas of a BS greater than 34.76 per 10,000 inhabitants. This rate decreased for residents living farther from the BS, as shown in Fig. 15.

We concluded that the relative risk of death by neoplasia, according to the distance from a BS in the Belo Horizonte municipality, from 1996 to 2006, was greater within a radius of up to 500 m from the BSs (Table 5). In the town of Netanya, Israel, in 2004, the authors also found an increase of 4.15 times in the cancer incidence of the residents of a zone up to 350 m from the BS, compared to those who lived outside that area (Wolf and Wolf, 2004). A retrospective study in Naila, Germany, showed that the risk of new cancer cases was three times greater among the patients who had lived at a distance less than 400 m from a cellular telephone transmitter antenna during the last ten years (1994 and 2004), compared to those who lived at greater distances (Eger et al., 2004).

In addition, only the deaths of those who were exposed since the first license date of the BS were included in the study, even though there were antennas that were installed in the register date (before the licensing date).

Also, we observed that the Central-Southern SD possessed the greatest antenna concentration in the city and the most electromagnetic contamination. This region contained 38.60% of the installed antennas in 2003 and 39.60% in 2006. Again, through georeferencing, we observed a greater concentration of specific cases of death by neoplasia in the region. The accumulated incidence rate per 1000 residents was the largest in Central-Southern SD, reaching 5.83; this rate was the lowest (2.05) in Barreiro region.

In the Central-Southern SD, there are no factories; it is a strictly residential area, with some services and commerce. No power lines, highways, airports or railroads exist in the area. However, many private vehicles come and go in the region, and its inhabitants possess higher social status and affluence. It contains many wooded streets and gardens. The Central-Southern SD has other aggravating exposures, including noise, gases, fumes, aerodispersoids, and hydrocarbonates, each of which also damage human health. Despite the presence of diverse and aggressive potential agents that may have influenced the quality of life and the health of the dwellers living in the area, the mortality rates remained concentrated near the antennas, with a dose-response gradient, and were not diffuse all over the city.

Age and sex did not appear to be a confounder in this study. In Belo Horizonte municipality, like all of Brazil, the population suffers from a demographic transition characterized by the aging of the population, and this is a possible confounder for all chronic degenerative diseases. Looking at the profile of the proportional mortality by age and gender throughout the 10 years studied, there is no specific trend for either men or women, and the highest percentage started at age 40 and increased to age 60. Irrespective of the year, the proportional mortality by gender and age remained stable during the period, suggesting there is no relevant change in the proportion of deaths by cancer when age is taken into consideration.

According to the ICNIRP guidelines, the human levels to the public at large (ICNIRP, 1998), for the frequency (f) band ranged from 400 to 2000 MHz, the electric field intensity E (V.m⁻¹) equals 1.375 f^{1/2} V/m, which equals 1.375 √f V/m.

These values are according to the reference level patterns for the public at large when compared with the current Brazilian federal law which establishes the following limits: for a 900 MHz field intensity an electric field of 41.25 V/m and a power density of 451.34 μW/cm², for a 1800 MHz field intensity an electric field of 58.33 V/m and a power density of 902.49 μW/cm². These human exposure limits are exclusively based on thermal effects.

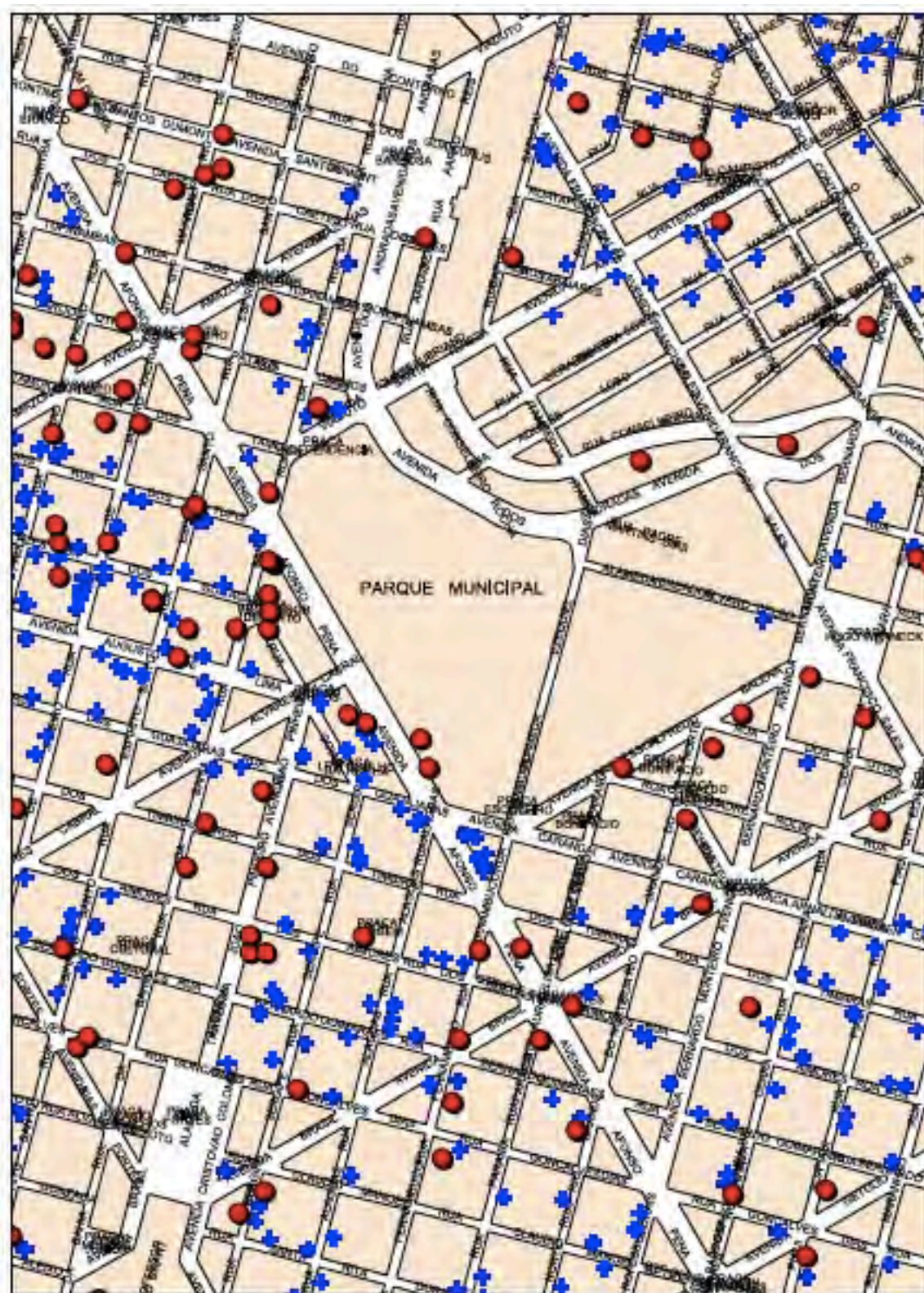


Fig. 10. Sample of geocoded deaths and BS locations in downtown Belo Horizonte City located in Central-Southern region.

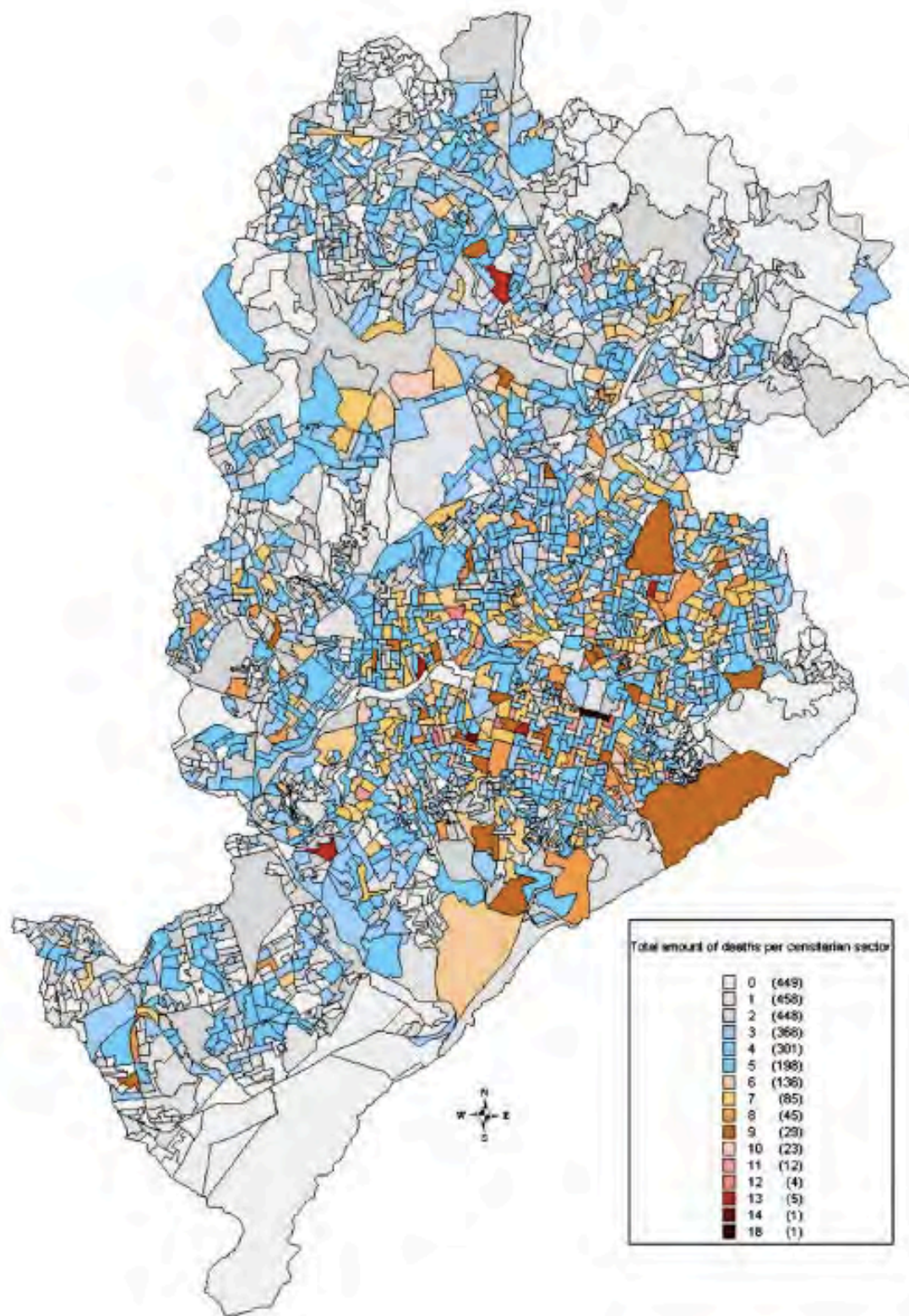


Fig. 11. Map of 7191 cancer deaths geocoded by CT.

In 2003, the largest electric field found during environmental monitoring of the BSs was 3.4 V/m and the greatest power density was $3.06 \mu\text{W}/\text{cm}^2$. In 2008, the largest electric field found during environmental monitoring of the BSs was 12.4 V/m, and the greatest power density was $40.78 \mu\text{W}/\text{cm}^2$ near the cellular

antennas in the 890 to 1800 MHz frequency band. These values were much larger than those reported in the Netanya study (approximately $0.53 \mu\text{W}/\text{cm}^2$). The smallest values found in the measurements were a field intensity of 0.4 V/m and a power density of $0.04 \mu\text{W}/\text{cm}^2$.

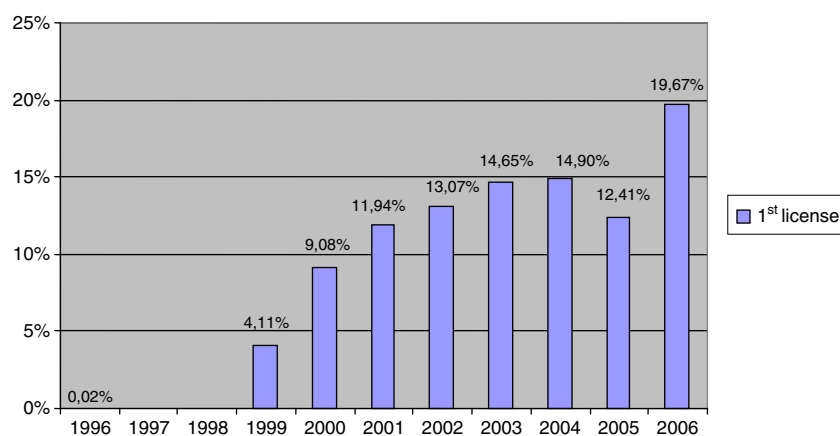


Fig. 12. Percentage of neoplasia deaths per year in the Belo Horizonte municipality, from 1996 to 2006, using the first license date.

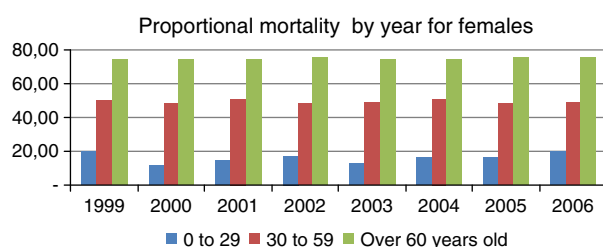


Fig. 13. Proportional mortality by year for females.

The major advantage of this ecological study is that it is the first epidemiological approach to determine the existence of a possible association between a determined exposure and a health outcome using the group characteristics.

The principal limitations of the present study concern the study design and the use of secondary data. By design, the group results could not be extrapolated to each person in the population. Although the data were well standardized and collected from official personnel in the City Health Department, they are subject to misclassification due to lack of information and errors in the entering of data and diagnosis. Finally, neither the life habits nor the genetic factors of the residents could be taken into account.

Despite these limitations, the present study has brought important contributions to the issue, the most important of which is the existence of a cluster of deaths by neoplasia associated with BS clusters. Although the direction of this relationship could not be specified, this work has demonstrated the existence of such clusters. Until more extensive studies are conducted, we urge the adoption of the Precautionary Principle and a revision of national policies toward stronger restrictions of the human limits associated with this

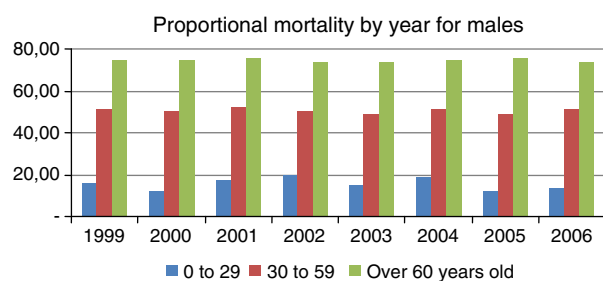


Fig. 14. Proportional mortality by year for males.

technology. The adoption of EMF and radiation levels similar to the more restrictive exposure limits of many other countries and towns would be one important public health provision. On this matter, we refer to the Porto Alegre Resolution.

The Precautionary Principle states that when there are signs of possible adverse effects to health or to the environment, although uncertain, the risks of inaction can be greater than the risks of acting, especially in relation to the control of human exposures to non-ionizing radiation. The Precautionary Principle reverses the burden of proof from those who suspect a risk on those who take the actions and affirm that only when new scientific discoveries will be recognized as the unique criterion to establish or to change guidelines. The principle asserts that precaution be maintained until new proven researches be done.

From May 18th to 19th, 2009, in Porto Alegre City, Rio Grande do Sul State, Brazil, occurred The International NIR (Non-Ionizing Radiation) and Health Workshop ("Seminário Internacional sobre RNI, a Saúde e o Ambiente"), sponsored by the Federal University of Rio Grande do Sul. The purpose of the workshop was to present lectures as a basis to initiate discussions among Brazilian and foreign scientists and public health authorities on the potential biological and health consequences and the setting of exposure limits of non-ionizing electromagnetic fields/radiation (NIR).

The workshop also was under the sponsorship of the Brazilian Ministry of Health, as well as some other governmental and non-

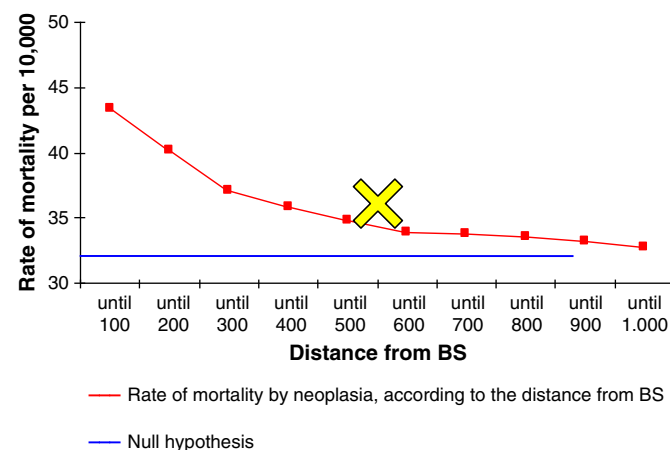


Fig. 15. Rate of mortality by neoplasia, according to the distance from the BS in Belo Horizonte municipality, from 1996 to 2006, and the null hypothesis.

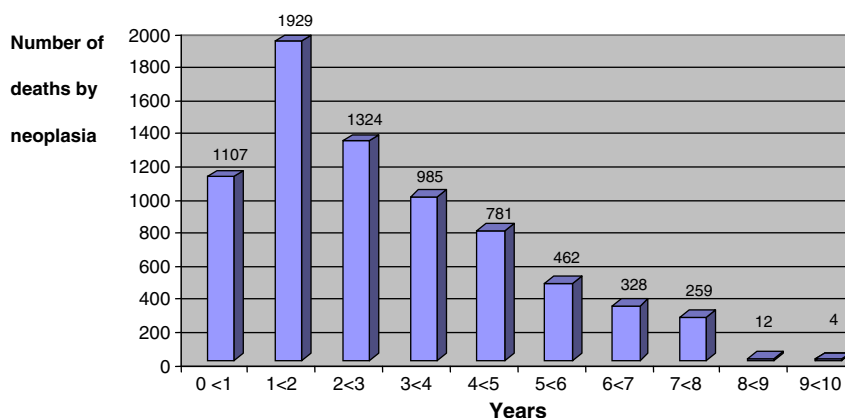


Fig. 16. Distribution of the number of deaths by neoplasia versus duration of exposure since the date that the first antenna in each analyzed CT came into operation.

governmental organizations. International researchers from several countries delivered talks on selected subjects.

Researchers, public health authorities, as well as authorities from the legislative, executive and judiciary governmental bodies from Brazil and other South American countries were also present.

Site: www.ufrgs.br/ppgee/rni.htm

After the event, the Porto Alegre Resolution was approved by the scientists from many countries and participants who have understood that the health protection, the well-being and the environment require the immediate adoption of the Precautionary Principle and some precautionary practices.

Site: http://www.icems.eu/docs/resolutions/Porto_Alegre_Resolution.pdf

5. Conclusion

This research showed the existence of a spatial correlation between cases of death by neoplasia and the locations of the BSs, in the Belo Horizonte municipality from 1996 to 2006.

The mortality rates and the relative risk were higher for the residents inside a radius of 500 m from the BS, compared to the average mortality rate of the entire city, and a decreased dose-response gradient was observed for residents who lived farther away from the BS. The major antenna concentration was located in the Central-Southern SD of the city, which also had the largest accumulated incidence (5.83/1000 inhabitants).

The measured values of the EMF, determined in 2008 and 2003, were substantially below the values allowed by the Brazilian federal law nr. 11934, May 5, 2009. Nevertheless, the values encountered in this study surpassed the limits of human exposure adopted by many other countries and cities in the world, including Italy (10 $\mu\text{W}/\text{cm}^2$); China (6.6 $\mu\text{W}/\text{cm}^2$); Switzerland (4.2 $\mu\text{W}/\text{cm}^2$); Paris, France (1 $\mu\text{W}/\text{cm}^2$); Salzburg, Austria (0.1 $\mu\text{W}/\text{cm}^2$); and Porto Alegre, Brazil (4.2 $\mu\text{W}/\text{cm}^2$).

New epidemiological studies must explore this issue with more timely and appropriate methodology to provide evidence that may confirm the relationship between risk and hazard at an individual level. Meanwhile, we strongly suggest the adoption of the Precautionary Principle until the limits of human exposure, as established in Brazilian Federal Law, can be re-evaluated.

Supplementary materials related to this article can be found online at [doi:10.1016/j.scitotenv.2011.05.051](https://doi.org/10.1016/j.scitotenv.2011.05.051).

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Precautionary Principle; Center for Safer Wireless Comments, Sep. 30, 2016

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Brief Comment

I am in opposition to 5G rollout, because the government has not done any studies on long-term health effects from exposure to 5G spectrum. In May 2016 the NTP showed a statistical increase in rare brain and heart cancers from rats exposed to cell phone radiation below thermal levels, yet the FCC has not done anything to revise its safety guidelines which are thermal based. To roll out 5G without doing studies on health first is NEGLIGENT. My children became sick from 4G LTE cell towers next to their school, and now we have to avoid cell towers. With FCC plan to put MILLIONS of small cells on residential streets, my children will become more ill. Health effects of 5G should be studied, not ignored!

Possible Hazards of Cell Phones and Towers, Wi-Fi, Smart Meters, and
Wireless Computers, Printers, Laptops, Mice, Keyboards, and Routers Book
Three, Gary Vesperman Comments, Sep. 17, 2016

**Possible Hazards of Cell Phones and Towers, Wi-Fi, Smart Meters, and
Wireless Computers, Printers, Laptops, Mice, Keyboards, and Routers
Book Three**

Since 2013 I have been emailed several dozen reports of possible medical and other hazards from intense electromagnetic radiation from cell phones and towers, Wi-Fi, smart meters, and wireless computer accessories including wireless computers, keyboards, mice, routers, printers, and laptops.

I have previously compiled a total of 400 pages of these reports in chronological order in two separate books with the same title as this “Book Three”.

All three ‘EMF Hazards’ books are linked at www.commutefaster.com/vesperman.html and www.padrak.com/vesperman. Over a dozen authoritative EMF-related reports are also linked at these two websites.

This report begins with “Disclaimers”, a table of contents, “Items of Outstanding Interest”, and a new supplementary set of potentially useful “Recommendations for Actions”.

Gary Vesperman
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Special thanks to Bruce. I will be working my way through your suggestions and posting the results on here for everyone.

Again, thank you very much everyone.
Cheers

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Health Implications of Long-term Exposure to Electrosmog

From: Kompetenzinitiative e.V. <Sekretariat@kompetenzinitiative.net>
To: garyvesperman@yahoo.com
Sent: Friday, September 9, 2016 1:10 AM
Subject: Mobilfunk-Diskussion: EUROPAEM EMF Guideline 2016

(Excerpt:)

Physicians are increasingly confronted with health problems from unidentified causes. Studies, empirical observations, and patient reports clearly indicate interactions between EMF exposure and health problems ...

MEDICINE

Health Implications of Long-term Exposure to Electrosmog

Karl Hecht's review of the Russian research is published now in English translation: Health Implications of Longterm Exposure to Electrosmog (German edition 2012).

(Excerpt:)

The review findings by Karl Hecht – which disappeared into the government archives as soon as they had been submitted and which we are now making available to the public in this brochure in its most comprehensive form to date – are based on the assessment of 878 Russian studies between 1960 and 1997 ... >>>

About Karl Hecht's brochure

“The information provided in this brochure makes clear that short-term studies cannot answer any questions regarding long-term risks. The current exposure limits, which we mostly owe to the physics way of thinking, are a scientific anachronism. Furthermore, by using the concrete example of a research review, it is shown how the authorities have ignored and continue to ignore that which is important for public health and a sustainable future, but would be contrary to economic interests.” (from the Summary)

"It is astonishing to see that the proponents of thermal effects of electromagnetic fields have learned nothing new over the last 40 years. The incorrect concept affects European and US exposure limits, which cannot claim to provide protection. It affects research projects that only conduct short-term studies. It affects policies that claim safety where a warning would be in order. And it also affects the administration of justice when incorrect judgments are passed – which the court is forced to do within the currently valid legal framework." (from Chapter 5)

The English translation of Karl Hecht's 64 pages long brochure is linked at http://kompetenzinitiative.net/KIT/wp-content/uploads/2016/07/KI_Brochure-6_K_Hecht_web.pdf

"EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses" is linked at <http://www.stralskyddsstiftelsen.se/wp-content/uploads/2016/07/EUROPAEM-EMF-Guideline-2016-for-the-prevention-diagnosis-and-treatment-of-EMF-related-health-problems-and-illnesses.pdf>

European Union's "COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)" is linked at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:199:0059:0070:EN:PDF>

Spanish report on electrosensitivity is linked at <http://www.lavanguardia.com/vida/20160802/403624742652/electrohipersensibilidad-sindrome-neurologico-prestacion-por-incapacidad.html>.

French report on dangers of radio frequencies is linked at http://www.lemonde.fr/sante/article/2016/07/08/alerte-sur-les-dangers-des-radiofrequences-pour-les-enfants_4965884_1651302.html?xtmc=portables_enfants&xtcr=1.

German report on electrosmog is linked at <http://www.strahlentelex.de/aktuell.htm>.

"Thank You for Calling in Deutschland" is linked at <http://kompetenzinitiative.net/KIT/KIT/thank-you-for-calling-in-deutschland/>.

German report from Austria is linked at <https://www.aktion21-austria.at/content/liebe-mitglieder-und-sympathisanten>

Actions of the European Commission regarding electromagnetic health effects and recommendations are linked at http://ec.europa.eu/health/electromagnetic_fields/eu_actions/index_en.htm

The following is linked at <http://kompetenzinitiative.net/KIT/KIT/english-brochures/>:

In December 2007, the Competence Initiative for the Protection of Humanity, Environment and Democracy has started its brochure series Effects of Wireless Communication Technologies. First translations of the brochures of the above-mentioned series are also available online.

Based on a broad scientific body, the publications confirm the conclusion the BioInitiative Report (www.bioinitiative.org) came to in 2012: Overloading the biophysical organization of life with zillions of artificially generated electromagnetic fields is one of the most dangerous aberrations of our time. For the sake of shortsighted economic interests and outdated technological solutions, the democratic constitutional state affords a technical and economic policy that can neither be reconciled with its responsibility for precaution nor with the currently valid fundamental and protective rights of its citizens.

With our print and online publications, we strive not only to show what risks and health impacts are known to independent researchers. We also would like to draw your attention to the social consequences when the truth and humans are treated with disregard.

The Series is published by

Prof. Dr. rer. nat. Klaus Buchner, Bernd Irmfrid Budzinski, Dr. med. Horst Eger, Dr. med. Markus Kern, Prof. Dr. phil. Karl Richter, Dr. rer. nat. Ulrich Warnke

Karl Hecht's brochure is already linked above.

Bees, Birds and Mankind – Destroying Nature by ‘Electrosmog’

Bees, Birds and Mankind

Destroying Nature by ‘Electrosmog’

Ulrich Warnke

The bio-scientist Ulrich Warnke is more familiar with nature's electromagnetic housekeeping than most. In this paper, he shows how wise and sensitive nature was about using electrical and magnetic fields in the creation of life [...]

Warnke's 47 pages long brochure is linked at

http://competence-initiative.net/KIT/wp-content/uploads/2014/09/ki_beesbirdsandmankind_screen.pdf

How Susceptible Are Genes to Mobile Phone Radiation?

How Susceptible Are Genes to Mobile Phone Radiation?

State of the Research – Endorsements of Safety and Controversies – Self-Help Recommendations

With Articles by Franz Adlkofer, Igor Y. Belyaev, Karl Richter, Vladislav M. Shiroff

Since wireless technologies of mobile phones and other communication networks have become big business, we also find conflicting tendencies side by side. Our living environment is being swamped with electromagnetic fields that raise intensity levels and show a wide range of novel characteristics [...]

Precautionary Principle; Cecelia Doucette Comments, Jul .11, 2016

July 11, 2016

Dear FCC Commissioners,

Three years ago an electrical engineering friend mentioned there could be biological harm from wi-fi and cellular technology. I investigated this extensively, and found thousands of peer-reviewed, published scientific studies from all over the world. See the National Institutes of Health PubMed database search on electromagnetic radiation adverse effects for over 3,000 published articles and studies:

<http://www.ncbi.nlm.nih.gov/pubmed/?term=%22Electromagnetic+Fields%2Fadverse+effects%22%5BMAJR>

I worked with my public school district, which did its due diligence to understand this issue, and we have become the [first in the nation](#) to put precautionary measures in place to protect our students and staff. I now get calls from parents all over the country looking to do the same after discovering wireless technology in schools, at home and elsewhere has given their children searing headaches, nose and ear bleeds, tinnitus, skin rashes, inability to concentrate, behavior issues, sleep problems and more. When they hard-wire and turn off the wi-fi the symptoms have resolved over time for most where they can control the radiation emissions. These are just the short-term effects of electrohypersensitivity (EHS); long-term exposure to wi-fi is being shown to cause cancer, infertility, heart disease, DNA damage and more.

We need to teach the public to use their personal devices more safely, but more importantly, we must stop putting antennas and utility “smart meters” on our homes, in our schools, and in our public spaces. 5G will put many more radiation-emitting wi-fi antennas in our neighborhoods.

While it's an exciting business proposition to become the first-to-market with 5G how can the FCC move forward with this when just last month the U.S. National Toxicology Program (NTP) released partial findings from a \$25 million study on cell phone radiation that confirms electromagnetic radiation is carcinogenic? This means all wi-fi is carcinogenic too as it operates off of the same electromagnetic radiation as cell phones.

The NTP informed the FCC, yet Tom Wheeler is still intent on [rolling out 5G](#), which will put even more radiation load on the unwitting public. He suppressed evidence of harm back in the 1990s when the first oncologist declared his patient died from brain tumors that aligned with the antennas in her cell phone, and he remains committed to corporate profit over public health today. I realize Mr. Wheeler is likely your boss, but please take the time to [hear it directly from the scientist](#) who lead the research for Mr. Wheeler back in the 1990s. After learning

cell phones are carcinogenic, Mr. Wheeler went on to discredit Dr. Carlo and never told the public.

If you've seen Will Smith's recent movie, "Concussion", the same is happening with wireless technology motives as the NFL: suppressing evidence of harm, trying to silence the scientists, and creating doubt among the public to perpetuate profits. It is classic redeployment of the tobacco industry playbook – also mentioned in "Concussion" – where the science is conclusive but kept from the public for decades. We cannot afford to wait decades with wireless technology as people are already getting very sick from electromagnetic radiation.

If this topic is new to you, the following 33-minute video with my local Board of Health will bring you up to speed. All of the documents I reference are included in the Comments section under the YouTube video. It will take time to absorb all of this if you are unfamiliar with wi-fi operating off of two-way microwave radiation, but I implore you, please do your independent research and stop the rollout of 5G until technology can be made biologically safe.

<https://www.youtube.com/watch?v=9T-4Aj6gb7A>

Former Microsoft Canada President Frank Clegg assures us we can still have technology, but it must and can be made to be safe. See below for a briefing he and top U.S. scientist Dr. Devra Davis gave to the Massachusetts legislature:

<https://vimeo.com/134411701>

We are all guilty of adopting wi-fi without understanding how it works; now that we know, it is our responsibility to ourselves, our children and future generations to act today to put it right. Please do your part as our public servants and make it a priority to come up to speed on this issue and protect our citizens over corporate profit. Please reach out if I can provide additional information.

Sincerely,

Cecelia Doucette
31 Fatima Drive
Ashland, MA 01721
[508-881-3878](tel:508-881-3878)

Precautionary Principle; Chuck Matzker Comments, Aug. 31, 2016

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Date Posted Aug 31, 2016

Brief Comment

Dear Sirs and Madams, I am strongly urging not moving forward in implementing 5G in any fashion until all health and safety risks are assessed honestly, unbiasedly, and with no influence from the telecommunications industry whatsoever. We need scientists who can come up with findings based on real science, without fear of losing their funding, having their credibility questioned, and other intimidation. We need health experts that specialize in how humans and all living biological organisms are affected by electromagnetic technology that is already being unleashed at a pace unknown in human history. I'd like to share my personal story with the current level of technology from the past ten years. I first became aware of microwave radiation in an offhand way in 2013. Firstly, I have to say that I was a huge fan of wireless tech since I got my first macbook in 2002. I had used wifi on train in the pilot program on the commuter rail since its inception, and loved the convenience. I had my whole condo on a wifi network. My entire family had iPhones, iPads, and we all talked with the phone right up next to our heads. Fast forward three years after I bought an iPhone. I kept my iPhone in the same pocket in my pants. And one day, in the interior of my thigh muscle, a very strange extremely fast-rhythmic pulsing would occur. I first thought it was one of those muscle spasms that would go away, but it went on for over a week non-stop. Then into two weeks. It was strange. So, I looked at all the possibilities it could be. I narrowed it down to my phone, after doing some research into how cell phones work. I then realized that the pulses from the phone had somehow entrained my muscles to pulse when the the phone was sending out it's signal to the nearest tower. I was deeply disturbed, but more annoyed that I had a rhythmic pulse in my inner thigh that I had no idea of it would go away. So that led me to learning to keep my phone away from my body, and as it turns out, it's in the phones' operating instructions to keep the phone away from the body. I wondered why it had this guideline, which led me to more and more scientific studies, spanning many years (including Dr. Carlo's studies for the industry). I wondered how much more microwave radiation am I exposing myself and my family to, thinking initially that this was a harmless technology. I am a curious person by nature, so I had to follow-through with the research. It was around that time that I started to experience heart palpitations and trouble sleeping, which I had never experienced before. I'll get to what I found was the cause later. After thoroughly researching the work of Martin Blank, and Henry Li, I acquired an electro-smog meter. I realized my wifi router, my dvd player, printers, and a host of other electronic devices in my living room, along with the four laptops (and corresponding bluetooth devices in my house were all sending out their own signals, night and day. Our phones were left on and charging next to our beds. I realized I was doing all the wrong things with this technology. We changed our behavior overnight. No more phones under pillow or falling asleep with the iPad on the stomach. No more leaving the wifi on all night. Changing our behavior to more safely live with this tech seems like the only option. I live in a condo, however, where we are also exposed to our neighbors wifi and other microwave signals. I ended up figuring out how to hard-wire my entire condo. That did help with my sleep, but not that much. I was still reading a strong signal from directly below my bedroom/workstation, where I work from all day long and sleep at night. I bought an electrosmog meter to see if I had missed any outstanding sources of radiation. I could control the amount of microwaves I was exposing my family to, but not the neighbors. Regarding my sleep problems and heart palpitations: it turns out my new neighbor had just installed a new wifi setup with two strong microwave signals directly below my bed, which I was being exposed to 24 hours a day. I asked her if she could turn off one of them, and she did (Comcast installs both signals by default when setting up, and only switches off the second signal if instructed by the user), and I saw an immediate improvement in my heart palpitations, and my sleep patterns were not noticeably disturbed. So just cutting down on the amount of microwave exposure has helped my health, but I

realize that we should not be exposing ourselves to non-ionizing microwave radiation at the frequencies and duration we currently are. I've had to delve more into the community when my son (whom I hadn't told any of this to at the time) kept coming home with headaches and needing to sleep, which was uncharacteristic of him. I took a tour of this classrooms, and noted that some rooms had industrial strength wifi routers. I made a connection, and read the bioinitiative report that the symptoms my son was exhibiting were consistent with the data levels in the studies. I became concerned that if it's affecting my child, wifi and microwave radiation in our Framingham schools is a threat to our children, and have proposed to the schools that we use the precautionary principle and stick with wired connections, rather than wifi. I have taken measurements in his school and determined that the levels our children are being exposed to is causing cellular damage to our children, which will ultimately affect their learning ability. We're already seeing a correlation between the unleashing of wireless technology in schools and test scores lowering across the board. I inquired about wifi with the Framingham superintendent's office, and I've proposed removing wifi to principal Patrick Johnson at Walsh, his CTO George Carpenter, and Superintendent Stacy Scott, and his CTO Alan Graham, and have received a reply, rather than an opinion, and ultimately forwarded the decision on this matter to the Framingham Board of Health (Chaired by Mike Hugo), which agreed after I presented to them, on the record that this is valid public health issue. We even had more than 50 people attend our international panel of experts here in Framingham who all testified that wifi is dangerous to children and needs to be removed. It was then that I found so many others that were experiencing the same things I was, coming from all over the state, and the country, even. I realized that this was more than just an isolated incident, and it's way bigger than just me and my family. I know that industry dollars and opinion are the norm, and that if one looks at the cursory data without digging in to find the facts, that it seems all but proven that wifi is safe, which is not the case, and I have facts from many reputable publicly available sources that I can cite. This matter is being dealt with in other towns in an thoughtful way (and in contrary to the telecom industry's wishes), and I'm hoping that we in Framingham and Massachusetts act intelligently and cautiously in this case. Waiting until the health effects are 100% proven is what the industry is counting on, but informed and intelligent citizenry sees through their profit-before-health attitude. We need to keep wired technology in schools, and pull out the industrial wifi that's exposing our children to known health hazards. I cannot rest until our children are safe. Feel free to reach out to me if you have any questions. Sincerely, Chuck Matzker

Precautionary Principle; Dr. Diane Schou PhD, Dr. Bert Schou, PhD.,
Comments (letter sent to FCC's OET), Sep. 2, 2013

FCC Comments on Notification of Inquiry,

ET Docket No. 13-84,
Reassessment of Federal Communications
Commission Radiofrequency Exposure Limits and
Policies

ET Docket No. 03-137,
FCC Proposes Changes in the Commission's Rules
and Procedures Regarding Human Exposure to
RadioFrequency Electromagnetic Energy.

Attached is a letter sent to:

Mr. Julius Knapp, Chief
Office of Engineering and Technology
Federal Communication Commission
Washington, D.C. 20554

Dr. Diane Schou
P.O. Box 99
Green Bank, West Virginia
24944
(304) 456-5558
Fax (855) 558-5888
September 3, 2013

Dr. J. Bertel Schou
P.O. Box 249
Cedar Falls, Iowa 50613
(319) 277-6661

Mr. Julius Knapp, Chief
Office of Engineering and Technology
Federal Communication Commission
Washington, D.C. 20554
Fax (202) 418-1944

12 pages

Dear Mr. Knapp

Dealing With EMR

The FCC responded September 14, 2012, to a letter we sent to Senator Grassley, requesting a White Zone and protection. The response was, however, unacceptableⁱ. Our own plight and that of many other individuals who are made ill by electromagnetic radiation can no longer be ignored. Avoiding cell towers, smart-meters, and Wi-Fi emissions are increasingly difficult, if not impossible.

Just as most people can eat a peanut, and just a peanut can kill someone else; we cannot tolerate electromagnetic radiation. The individual, allergic to peanuts, can avoid eating them and can keep peanuts out of their home. Electromagnetic radiation (EMR) cannot be blocked out from entering our homes nor stopped from entering our property, and living spaces.

Sometimes EMR is called electro-smog. The emissions are invisible, far-reaching, penetrating, and have amplitudes (power levels) much higher than quieter, natural background radiation.

Bert and Diane own a farm in Cedar Falls, Iowa, where they lived until a cell tower was erected nearby, and Diane's life became a misery of intolerable pain. Bert continues to cautiously live and work on the farm, but Diane was forced into exile, to live a nomadic existence, until she found a safe place to live in the United State's National Radio Quiet Zone close to the National Radio Astronomy Observatory (NRAO). The FCC knows some people who are harmed by EMR (technological lepers) have gone to Green Bank, West Virginia.

This is a very serious and compelling situation. As the increasing emissions from many sources converge in the atmosphere, we are creating a soup of un-regulated and un-monitored frequencies. This man-made radiation is artificial and is totally new to the environment. Nothing – no plant, no living thing – has ever been exposed to such EMR in the life of this planet until now. Nothing is therefore adapted to it.

We urge you to undertake the following:

- 1) White Zone areas: The government and military protects delicate instruments from EMR, so how is it that human bodies don't need the same? It is urgent that those of us, who are unable to tolerate exposure to EMR, have access to or be provided with areas where we are not harmed, areas where we can safely live in a humane fashion and where we can be productive. It appears the FCC will not entertain any notion regarding regulating emissions. Will the government grant areas to be White Zones that will shield and protect us?
- 2) Housing is difficult to find in Green Bank, an unofficial White Zone. Perhaps housing may be offered as will likely be for victims of Hurricane Sandy or the Nor'easter? Help is needed for those in forced exile too. Perhaps residences in and around the military base of Sugar Grove, which may be (according to rumors) partially shutting down? For some people the choices are to live in a car (to reduce harm) or to return to exposure (to risk harm, to live with continual pain or to possibly be willing to die because there is no relief). This is unjust.
- 3) The Department of Justice needs to recognize technological leprosyⁱⁱ as a disability. Basic civil services cannot be used if the services continue to promote harmful emissions; which cause even more struggles for – those who already have had their lives changed or those whose disabilities are not recognized.
- 4) Keep NRAO. Did the EMR industry influence NSF into closing NRAO? Is this another way to cause harm to technological lepers, because we are viewed as a threat to the EMR industry? Because we are asking for White Zones, is this a way for the EMR industry to prevent Green Bank becoming a White Zone? The economics from NRAO is needed here for residents and those in forced exile.
- 5) Technological lepers need the FCC and the FCC needs technological lepers. People who detect harmful EMR emissions, are useful and irreplaceable.
- 6) Within the FCC and the U.S. government, is there anyone who is a technological leper? How many technological lepers work there? Have there

been people who wished to visit or attend meetings but because they are technological lepers and become harmed when exposed, they cannot be present? How many people worked for the FCC and the U.S. government and had to leave because they became technological lepers? Were changes made so technological lepers could continue working and be productive?

- 7) Put people first. Where is the Precautionary Principle? Can industry, businesses, users of EMR, as well as the FCC be likened to undisciplined orphans?

Undisciplined orphans: without parental guidance, doing as they want, self centered – acting for their own interests or gain, putting EMR everywhere, injuring others, hiding information, not taking responsibility, and no one to control them.

- 8) Technology seems to be addictive. Many addicted users of EMR do little else. Possibly, because it is so addictive, they deliberately ignore the harm their actions are causing to others and even to themselves. It seems the addicting pay, rewards, wins, tweets, become the selected activity, even when people, including the users, are sensing something is wrong (i.e. headaches, numb fingers, forgetfulness, diabetes, dizziness, etc.). They become angry and sometimes abusive when there is interference.

Promote the Precautionary Principle.

- 9) Give power to government agencies to protect technological lepers. Tighten the reins to the powerful EMR industry and EMR economy. Technological lepers are not safe and cannot live in peace, when they become injured by EMR emissions in their homes, outdoors on their own properties, at work, at school, and where their families or friends spend time.

During holidays, it is difficult to reach out to others (i.e. friendship, giving, helping, sharing, celebrating) when an isolated person needs just the basics i.e. food, warmth, and a place to live.

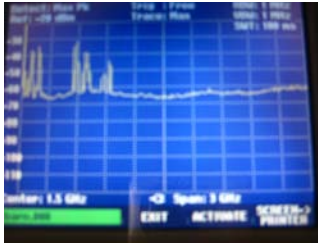
Give power to government agencies to put people first. Technological lepers need to have guaranteed safe places to live, to function, to survive, to be productive and to celebrate life.

- 10) Distribute credible meters to detect, measure, and record invisible, penetrating: electrical fields, magnetic fields, non-ionizing radiation, and ionizing radiation. It's not just enough to be told that everything is well and it would seem the wireless institutions are not out for our well being. Without meters, it may be claimed EMR does not exist. Building the meters and measuring environments could become valuable detective research businesses. See endnoteⁱⁱⁱ

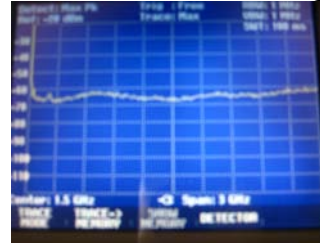
- a) We need to know and be actively aware of what invisible emissions we are living / working / sleeping in on a daily bases. Look at the differences

recorded between

Cedar Falls, Iowa 1996 (left) and Green Bank, West Virginia 2012 (right).

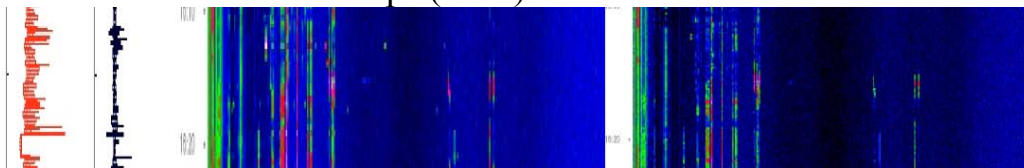


Schou



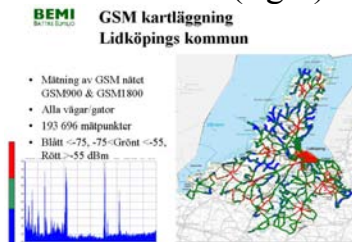
Schou

- b) Emissions logged over while driving, example: document changes in exposure. Electrical fields, magnetic fields, non-ionizing radiation. Time is vertical. Horizontal is frequency, color is amplitude (power level). Twenty second max hold and sweeps (trace). GPS coordinates were also recorded.



Schou

- c) Map EMR within towns, cities and rural areas. Two examples: BEMI by Tegenfeldt (left, he did this as a profession) and map of potassium concentrations (right)



Google

- 11) The EMR industry and our government do not seem to be responsible nor respectful. This is fundamental as most business models still do not recognize or take in to account any consideration for the people. Industry and government agencies repeatedly referenced the FCC. As Diane was being harmed, and requested that emissions be checked, the FCC and government agencies contacted would not do so.
- 12) Wrong assumptions:
- Assuming technological lepers react to all frequencies, is false.
 - Assuming the emission from one cell phone equals or mimics all frequencies is false.

One cell phone does not produce all frequencies.

Technological lepers are individuals, they are not the same. Some technological lepers may be harmed by frequencies others can tolerate and vice versa.

Were technological lepers injured by a single frequency, several frequencies,

other exposures? Were these continual or pulsing? To understand this more, use meters to investigate the unknown frequency at the time and under what conditions. Measure cellular changes, blood changes, heart changes, eye changes, headaches, skin changes, and more effects.

A few technological lepers become disabled when exposed to more than just several frequencies. Over time, observers need to learn what are the unknown frequencies. Questions: is it a combination of frequencies? Are frequencies modulated or pulsed? Is there something else (i.e. a chemical) present?

Technological lepers do not need meters to know what they detect or when they are being harmed. Meters are needed in such places as churches, cities, hospitals, government places, so others (officials or people) may verify and learn what technological lepers are physiologically reacting to.

- 13) EMR detective research: Measure frequencies (*all* frequencies) in the environments where people are harmed.

One technological leper, identified pain – the same pain when exposed to EMR. Two meters showed no emissions from cell phone nor Wi-Fi. The technological leper definitely felt pain and felt certain there was EMR in that environment. A third meter, measuring more frequencies, displayed a powerful emission about 24 GHZ, not of cell phone nor Wi-Fi frequencies. The technological leper was right. If this had been a research study, a report would have incorrectly attributed the pain as imaginary, psychological, or to a placebo. Could this be a flaw in some research reports?

There are many symptoms (Bevington, 2012) and , many frequencies, and people are not alike. One needs to go to an individual's environment and measure the electromagnetic radiation of *all* the frequencies in the environment.

- 14) Allocate dollars for research. While industries will fund their own conclusions, often we the people of this country are the only advocates who can stand up for what is happening. A few research ideas were suggested in "EMR detective research" and other research ideas are in the endnote.^{iv}
- 15) Don't phase out telephone lines or the U.S. Postal Service. Wired telephones and the U.S. Mail and direct contact are often the only access to people in exile. What would be used if EMR were to be discontinued?
- 16) Is anyone aware of a developing problem – Twitter, Facebook, email, ".com" etc. are the only contacts acceptable. When computer usage is required, access is not possible for people harmed or disabled by EMR because being near electronic devices is unbearably harmful for many technological lepers. Require quick access (not always the case with automated telephones) via telephone and U.S. mail with competent people accessible.
- 17) The FCC disregarded testimonies – people reporting harm they witnessed, harm they experienced, and research finding health effects (EMR-Policy-

Institute, 2009a) (EMR-Policy-Institute, 2009b). In a 2012 letter, the FCC did not cite documents correlating health effects from EMR exposure such as: (WHO International Agency for Research on Cancer, 2011), (McCarty et al., 2011), (Rea et al., 1991), or research papers written by Dr. Olle Johansson, Dr. Henry Lai, Dr. Samuel Milham, Dr. Andrew Marino, Dr. Magda Havas.

- 18) The FCC enclosed a biased study in their reply. The study of literature by Rubin seems “Cherry picked”; see (Havas, 2012).
- 19) The FCC would not come to document the toxic environment as Diane was being harmed. They repeatedly informed us either a) the cell tower is safe or b) there are no health effects. Harm from EMR is real; protection for people from EMR has not been obtained but is needed.

Injury from EMR is real. Living in our Iowa home, Diane became ill, eventually overexposed from the emissions of a newly built cell tower. If living at home had been safe, Diane wouldn't have been forced into exile, away from Bert, away from co-managing their research farm business, nor would they have written this letter.

The above requests and requests in the addendum are urgent. The time to act was yesterday, but regulatory action is still possible.

Respectfully Yours,

Diane Schou, Ph.D.

Bert Schou, Ph.D.

Enclosures: The WHO International Agency for Research on Cancer. IRAC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans. Lyon, France: World Health Organization. 2011. (page 1 of 6). Havas M. Science 101: Cherry picking & black swans. 2012 with link to You Tube (please view this).

Cc: Senator Grassley, FCC comments on notification of inquiry dockets 13-84 and 03-137, Senator Harkin, Representative Braley, Senator Rockefeller, Senator Manchin, Representative Rahall.

Bevington, M. (2012). *Electromagnetic Sensitivity and Electromagnetic Hypersensitivity (also known as Asthenic Syndrome, EMF Intolerance Syndrome, Idiopathic Environmental Intolerance - EMF, Microwave Syndrome, Radio Wave Sickness) A Summary*. London: Capability Books.

EMR-Policy-Institute. (2009a). In the Matter of A National Broadband Policy for Our Future: EMR Policy Institute Comment. In FCC (Ed.), (pp. 485). P.O. Box 117 Marshfield, VT 05658: Federal Communications Commission GN Docket 09-51.

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Rea, W. J., Pan, Y., Yenyves, E. J., Sujisawa, I., Samadi, N., & Ross, G. H. (1991). Electromagnetic field sensitivity. *J Bioelectr*, 10, 241-256.

WHO International Agency for Research on Cancer. (2011). IRAC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans. Lyon, France: World Health Organization.

ⁱ The FCC cited and sent a paper by Rubin. Nicols Fox, harmed by electromagnetic radiation, noted “The paper the FCC enclosed was biased. Search for another paper also written by Rubin which appeared in the British Medical Journal in 2006 (Rubin JG, Hahn G, Everitt BS, Cleare AJ, Wessley S. Are some people sensitive to mobile phone signals? Within participants double blind randomized provocation study. *Br Med J*. 2006;332:886-91). The abstract to this study appears to show that EMR is psychological in origin. However, a close search of the entire study would demonstrate its weakness. For example, truly ES individuals would have been eliminated as subjects by the fact the study was conducted in a) an urban area, b) a modern office building, c) an office furnished with modern office equipment. Any of these would have been a deterrent to the participating of sensitive individuals.”

A paper verifying health effects, McCarty, D. E., Carrubba, S., Chesson, A. L., Frilot, C., Gonzalez-Toledo, E., & Marino, A. A. (2011). Electromagnetic hypersensitivity: Evidence for a novel neurological syndrome. *Int J Neuroscience*. doi: 10.3109/00207454.2011.608139. This paper may have precipitated the media and the BBC to interview people harmed by electromagnetic radiation.

ⁱⁱ Technological leprosy is not a contagious virus – it is a name created to portray the nomadic living conditions experienced by people harmed / injured / disabled by – EMR. To avoid

symptoms linked to EMR exposure (Bevington, 2012), technological lepers avoid areas with cell towers, Wi-Fi, smart meters, battery run devices, power lines, etc.; they shy away from people (who carry, wear or use technological devices), and avoid crowds. Many technological lepers experience stigmas of being shunned, abused, harassed, bullied, excluded, and threatened.

Even in remote areas refugees gather, technological lepers find they still need to be cautious. As individuals, they are not the same; some may react to frequencies others can tolerate and vice versa.

Names for this condition include: electromagnetic hypersensitivity, EHS, electromagnetic sensitivity, EMS, electrical sensitivity, ES, microwave sickness, radio wave sickness, idiopathic environmental intolerance, IEI, EMF sensitivity.

Idiopathic is misleading. Illness, sickness, intolerance, or sensitivity portrays there is something wrong with our bodies, we have been injured. Radio-wave sickness implies one is harmed by AM or FM radio frequencies and not harmed by electrical fields, magnetic fields or frequencies above radio bands. Electromagnetic hypersensitivity implies one can tolerate non-ionizing radiation but not electrical or magnetic fields.

Technological lepers have been injured, harmed, disabled, poisoned, overexposed, and are victims from EMR emissions.

More suitable descriptions include: electromagnetic radiation disabled, electromagnetic radiation injured, electromagnetic radiation wounded, harmed by electromagnetic radiation, overexposed to electromagnetic radiation, electromagnetic radiation poisoned, or electromagnetic radiation victim. These descriptions might be too long, use many words, and people generally do not grasp the concept of EMR.

No one wished to be a technological leper (both disabled and the words). When “technological leprosy” is used, many people immediately understand, make changes, and take precautions to protect us.

iii Build meters and antennas to measure: the electrical fields, contaminated (dirty) electrical fields, magnetic fields, frequencies of non-ionizing radiation (to study all frequencies, combinations of frequencies, pulsing or modulation), ionizing radiation (Fukushima, etc.), GPS coordinates, date and times. Build the meters to record and save. Build transportable meters that are accurate, easy to use and easy to understand. Build meters to log emissions over time. Build meters that are similar to black boxes in aircraft and easily accessed for use in vehicles. Build meters that could have revealed EMR influence before and during events such as the Detroit marathon. Build meters that log EMR exposure levels and changes when errors occur in operating rooms. Include EMR meters in black boxes to document when pilots make errors in aircraft. Build meters to report EMR levels and changes when vehicle accidents occur. Install meters in environments where learning or alertness is important, Build meters to measure EMR in environments where people become ill. Build meters in environments where poor decisions are made.

Build meters to map EMR in towns, cities and rural areas. Maps of EMR are helpful for people and officials to compare health effects and location or time of environmental exposures. Maps help people decide where to live. Maps warn of unsafe environments. Get measurements of emissions published and available to people. Build meters to record photos of locations as well as emissions, GPS coordinates, and time.

iv Research questions from a technological leper:

- Do EMR environmental conditions affect abilities to multi-task? To react quickly? Document changes or accumulations of EMR, look for trends, note incidences, to avoid future disasters. It is not likely the contaminating EMR in the environment can be reliably measured after the fact. If a logging meter were working before, during, and after, precautions could be places to avoid future problems.
- What were the EMR environmental conditions when: a) the airport control tower operators fell asleep? b) pilots forgot to land at the Minneapolis Airport? c) control tower error, planes too close? d) it was unusual that three healthy marathon runners died in Detroit; isn't it suspect when two runners died at the same time, and two runners died at the same location? e) increased suicides by military personnel who were not deployed? f) surgical errors increased at a Rhode Island hospital? Was EMR involved in any of these? Harm can be direct, indirect, or both.
- Where does the radiation created go? Where is it absorbed? Exposed / not exposed / exposure over time: changes in plants, changes in plant location, changes in animals, changes in insects. Is Earth absorbing some and rebelling? Exposed / not exposed / exposure over time: changes in DNA, changes in viruses, changes in the blood brain barrier, changes in blood. What are time frame trends for people to be harmed? How can exposure accumulations be measured? What are the time frames for technological lepers to be healed when not exposed?

International Agency for Research on Cancer



PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as [possibly carcinogenic to humans \(Group 2B\)](#), based on an increased risk for [glioma](#), a malignant type of brain cancer¹, associated with wireless phone use.

Background

Over the last few years, there has been mounting concern about the possibility of adverse health effects resulting from exposure to radiofrequency electromagnetic fields, such as those emitted by wireless communication devices. The number of mobile phone subscriptions is estimated at [5 billion globally](#).

From [May 24–31 2011, a Working Group of 31 scientists from 14 countries has been meeting at IARC in Lyon, France, to assess the potential carcinogenic hazards from exposure to radiofrequency electromagnetic fields](#). These assessments will be published as Volume 102 of the IARC *Monographs*, which will be the fifth volume in this series to focus on physical agents, after [Volume 55](#) (Solar Radiation), [Volume 75](#) and [Volume 78](#) on ionizing radiation (X-rays, gamma-rays, neutrons, radio-nuclides), and [Volume 80 on non-ionizing radiation \(extremely low-frequency electromagnetic fields\)](#).

The IARC Monograph Working Group discussed the possibility that these exposures might induce long-term health effects, in particular an increased risk for cancer. This has relevance for public health, particularly for users of mobile phones, as the number of users is large and growing, particularly among young adults and children.

The IARC Monograph Working Group discussed and evaluated the available literature on the following exposure categories involving radiofrequency electromagnetic fields:

- occupational exposures to radar and to microwaves;
- environmental exposures associated with transmission of signals for radio, television and wireless telecommunication; and
- personal exposures associated with the use of wireless telephones.

International experts shared the complex task of tackling the [exposure data](#), the [studies of cancer in humans](#), the [studies of cancer in experimental animals](#), and the [mechanistic and other relevant data](#).

¹ [237 913 new cases of brain cancers](#) (all types combined) occurred around the world in 2008 (gliomas represent 2/3 of these). Source: [Globocan 2008](#)

SCIENCE 101: CHERRY PICKING & BLACK SWANS

July 26, 2012. When I am asked to testify as an **expert witness** at a hearing, I am asked to submit a written document that will accompany my oral testimony. The question I address in my expert testimony is, "What scientific evidence do we have that this form of energy (low frequency electromagnetic fields, radio frequency radiation, or whatever) is harmful below guidelines?"

But that is not the question **adjudicators** want to hear. They want scientists to present a review of ALL literature so they can decide for themselves even though they are not qualified to address that question—no matter how brilliant they may be—if they don't understand the scientific method. **There is a disconnect between the legal system and the scientific method** and *weight-of-evidence* and *falsifiability* are two areas where the legal system fails to understand science.

Journalists often make the same mistake and label scientists as being biased or having preferences when they present information showing that something is harmful without presenting the same number of studies showing that something is safe.

Unfortunately, **policy makers** fall into the same category. *They just don't get it!* And—because *they don't get it*—we have a lag in critical policy decisions that need to be made in a timely fashion. The result is that guidelines remain non-protective for much longer than necessary.

One key that gives this away are statements using the "**c-words**." What are "c-words"? *Conclusive, consistent, convincing* often placed before the word "evidence" and preceded by the word "no".

A typical statement might be, "We have no conclusive, consistent, convincing evidence that bla-bla-bla is harmful below guidelines." As soon as you hear these words you recognize that evidence does exist but the person making

this statement doesn't hold that evidence in high regard. That person seldom expands by indicating what kind of evidence would be classified as *conclusive*, *consistent* or *convincing*, because if that evidence were available s/he would be in a quandary.

Science has a way of dealing with this "confusion" (another c-word) and that is the concept of falsifiability coined by Sir Karl Popper, one of the leading and most influential philosophers of science in the 20th century.

That concept is explained in a 10-minute video entitled "Science 101: Cherry Picking & Black Swans." Click [here](#) for link to video and send it to your favorite journalist, policy maker, and lawyer who deal with issues that involve science.

<http://www.magdahavas.com/science-101-cherry-picking-black-swans/>

<http://www.youtube.com/watch?v=QyzZX-bCiqs> View this You Tube

Precautionary Principle; Evelyn Savarin Comments. Sep. 3, 2013

Rationale for Reassessment of the RF Safety Guidelines

In light of the continuing lack of uncertainty on the safety of RF exposures <http://www.fcc.gov/guides/wireless-devices-and-health-concerns>, and lack of worldwide research consensus on the health impacts of RF products, I ask this FCC to open up debate of the adequacy of current RF standards to protect public health and the environment, especially our children.

Included in this review should be a review of FCC current emission monitoring program, its sufficiency and insufficiency to provide adequate oversight in monitoring the emission of this country's RF installations and product deployments.

The FCC admits it is not a health agency and claims it defers to other health agencies in the government to offer guidance on the subject. When the other health agencies, EPA, FDA have shirked this responsibility over the last 13 years, during our greatest growth and penetration of RF wireless products the public can take little comfort that any agency of government is truly considering the health and safety of this nation and more vulnerable in our population including, children, elderly, and those with chronic and acute illnesses from RF overexposure

One of the more pivotal Federal documents in the last 10 years that points to the rationale for reevaluating our RF safety standards is the 2008 National Institute of Health document entitled [“Identification of Research Needs Relating to Potential Biological and Adverse Health Effects of Wireless Communications”](#). Although the documents main intent was to call for more research based on its review of the scientific evidence at the time, it pointed out one of the most glaring gaps in the research up to 2008 and continuing to the present :

“there is a need to characterize exposure of juveniles, children, pregnant women, and fetuses both for personal wireless devices (e.g., cell phones, wireless personal computers [PCs]) and for RF fields from base station antennas. This characterization includes taking into account gradients and variability of exposures due to the actual use of the device, the environment in which it is used, and exposures from other sources, multilateral exposures, and multiple frequencies. The data thus generated would help to define exposure ranges for various groups of exposed populations.

Please Read the whole “Dosimetry and Exposure” section to fully understand why our current FCC guidelines and negative research findings are insufficient and cannot offer assurance that the public is being protected from the toxic effects from increasing variety of RF exposures and frequencies on a 24 hour, daily basis.

Perhaps recent [High Court of India decision](#) sums it best up why it is paramount that the FCC reevaluate the current standards and guidelines After taking into account and examining Industry evidence pointing to a lack of scientific evidence that current public exposures to RF are harmful, and defendants evidence (State of Rajasthan and the harmed individuals) that shows the health and environmental effects of RF, the Court agreed to support the State's newly restricted laws for RF installation. It allowed the State to restrict cell tower installations away from schools, hospitals, high density areas, parks and permitted the state to proceed

taking those cell towers down that do not conform to the new law. It took into serious consideration fear from cellular providers would not suffer from insufficient coverage. The prescient point that sums up the Court's decision is as follows: (p. 177)

*"..... precautionary approach has to be adopted in such matter and thus, the decision taken by the State Government is in accordance with the dictum laid down by the Apex Court in the case of M.C.Mehta Vs Union of India & ors. (supra) wherein it has been held that even in case of reasonable suspicion or doubt, precautionary principle requires anticipatory action to be taken to prevent harm. **Lack of scientific certainty and direct evidence of harm cannot come into the way so as to take preventive measures.**"*

FCC has asked that a dollar figure be provided for costs and benefits of reassessing the adequacy of Current standards. I find this appalling. Certainly this is possible in terms of health costs, lost income and perhaps loss to the productivity of the population over time, but it should not be the responsibility of an individual or individuals with limited income to come up to the numbers that Telecom industry can financially furnish to support its position to weaken the standards.

In 1965 the Supreme ruled in (**Scenic Hudson v. Federal Power Commission**)

*If the Commission is properly to discharge its duty in this regards, the record on which it bases its determination must be complete. The petitioners and the public at large have a right to demand this completeness. . . the public is entitled to know on the record that no stone has been left unturned.....**A regulatory commission can insure continuing confidence in its decisions only when it has used its staff and its own expertise in manner not possible for the uninformed and poorly financed public.** In this case, as in many others, the Commission has claimed to be the representative of the public interest. This role does not permit it to act as an umpire blandly calling balls and strikes for adversaries before it; the right of the public must receive active and affirmative protection at the hands of the Commission.*

Under NEPA, "federal officials are required to assume the responsibility that the Congress recognized . . . as the obligation of all citizens: to incorporate the consideration of environmental factors into the [federal] decision-making process." This points to one more reason why Telecommunications Act is clearly in violation of the law in its Section 704, a law that has taken precedence over every other state or local action that desires to be more proactive and preventive of its community environment and public health from RF exposures.

Monetizing My Personal Experiences from RF Exposure;

Although I cannot put a dollar figure on my loss of income I can certainly account how much it has compromised my earning potential. I cannot assess my loss of health for I am relatively healthy because I took the warning signs that my body was giving me to RF/EMF radiating devices as a indicator to change my lifestyle and become more proactive about reducing my exposure.

My problems began over 20 years ago when I was in grad school for Urban planning, hoping to start a new career where I could finally envision gaining sizable new income from my present limited work potential . It was then through a series of trial/error and eliminations did I discover I had a sensitivity to electromagnetic fields of varying frequencies and powers. Only when I could remove myself from the growing umbrella of RF & other EMf frequencies could I be more productive, think more clearly and sleep better. With the growing proliferation of RF devices and this final understanding of my limited ability to participate in this growing wireless and technological revolution, have I suffered immeasurably in sufficient income generating endeavors, and a stable home environment.

My life has been turned upside down. I live almost a nomadic life trying to find a peaceful place to rest and sleep. I was never to realize my dream as an urban planner for after considerable accommodations by my professors to be able to limit my computer use, I was not able to work for more than 2 years after graduation, at which time working continuously in front of a computer and living close to broadcast towers made my health suffer, reflected in rising blood pressure and loss of hand circulation from use of a computer. I had to completely quit urban planning profession to see my blood pressure return to normal. My sleep never improved until I moved far away from all the antenna farms in my area. This was over 14 years ago.

I tried going back to teaching on a more limited bases, but schools have now become a wireless nightmare, once again limiting my ability to work. I would feel dizzy and unfocused as the radiation levels increased.

I have moved over 7 times in the course of 13 years, always trying to find a more peaceful setting. My income from some inheritance has become greatly depleted. My social security is very limited due to my short work career.

My current living environment is not ideal, but its become all I can afford, I live in a mother-in-law where the homeowner is not necessarily electro-sensitive but shares my interest in lowering Rf exposures, so she does not use WIFI in the home at all, and has agreed to turn off all cellular devices when in the home. For this I am trully grateful. The mother-in-law is in a concrete basement with little light, but the concrete offers some mitigation from high outside RF exposures.

I have been forced to spend considerable dollars on RF metering devices, some of which work well while others don't in order to better assess my living environment and understand why at times I am unable to rest properly. Some of those meters have been a godsend.

I yearn for the day I can live free of outside RF interferences as I once did, in housing of my own choosing and work that can gain me some income and more predictable association with my family and others.

Conclusion:

I ask this commission to fully appreciate that Telecom players are not the only sector of society that must be considered in the development of our RF safety standards. Whether many scientific studies like to point to the fact we are imagining are symptoms as EMF/RF induced, the number and level of studies that point to RF/EMF contributing to a series of cellular and health disorders is numerous and growing and should be sufficient in opening up the debate on RF safety guidelines

Preponderance of evidence should not be the overriding factor for evaluating the need to reassess the Rf safety guideline. A potential emission and toxin that is so ubiquitous, invisible to the naked senses, and unpredictable in isolating its effects, should be evaluated for no other reason than 100s of studies from all corners of this world have shown the health and biological adverse effects that can occur from its exposure.

The EPA should be designated to review and reassess thoroughly the Health impacts of Wireless radiation and to determine future Research needs.

The FCC should proceed at limiting exposure for vulnerable population, children, etc.

The FCC should seriously consider allowing local and state bodies the ability to designate areas of land and wireless free zone to give those who wish not to be overly exposed to this form of radiation a chance to live a more productive life.

The FCC should give more authority to the states to rule on its criteria to protect public health from RF exposure.

For Review of the Scientific research:

www.bioinitiative.org

http://www.biolmedonline.com/Articles/Vol4_4_2012/Vol4_4_202-216_BM-8.pdf

https://docs.google.com/document/d/1mEFSvE4XMbrr2N7NYANhXhD3D_8r1EY9STjoSul4aW4/edit

Precautionary Principle; Jamie Lehman, Comments, Jun. 19, 2013

Dear Sir or Madam:

The FCC limits on radio frequency need to be severely lowered. Multiple layers of electro smog are not being accounted for in the safety limits. More and more people are becoming severely sickened, are living out of their cars as a result of the so-called Smart Meters on and about their homes, and some are becoming severely violent from wireless radiation. People are having to give up their life savings and flee to the Radio Free Zone just to escape the unbearable health symptoms of environmental radiation exposure. There are over two thousand studies that have come across my computer indicating the horrific adverse biological effects of wireless radiation. We need to adopt the Precautionary Principle.

A single home may have forced pulsed radio frequency signals continuously, 24 hours a day, 365 days per year from:

- Wireless water meter transmitters
- Electric supplier meter transmitters with two wireless modems
- Gas company wireless meters
- Utility routers on poles

Non-pulsed radio frequency from:

- Cell towers
- Wireless home routers
- Personal cellular phones
- Wireless computer devices
- Wireless home security systems
- Cordless phones
- Baby Monitors

I had serious central nervous system injury and was hospitalized due to pulsed radio frequency via utility Smart

Meters. I began to develop a stutter, my memory was failing, I had heart attack symptoms, my internal organs began to heat up and felt like they would explode, I received shocks to my head and metal on my teeth, lost control of my bladder after walking up to a Smart Meter, had severe insomnia, chronic bronchial infection, numbness and tingling in my extremities, and extreme anxiety just to name a few of my symptoms. Our electric Smart Meter was removed, but I was not able to begin to function again at our home until two neighbors removed their electric Smart Meters. Nine months later, I have still not fully recovered.

The adverse biological effects of wireless radiation affect every cell in a person's body. Your tissue does not have to be on fire in order for damage to occur any more than your tissue has to be on fire to know that there are long term consequences to tobacco smoke, alcohol, and other drugs.

I urge you to act now to lower the permitted wireless radio frequency levels before you or someone you love begins to show the signs of radiation sickness. You too may find yourself facing a horrific health situation that is extremely difficult to cope with.

Sincerely,

Jamie Lehman

Sent From My Plugged In Computer
Wi-Fi Injures Your Family & Pets
doctorsforsaferschools.org
radiationrescue.org

Precautionary Principle; Marlene Brenhouse, Comments, Mar. 7, 2012

I endorse the statement made by Joel Moskowitz, PhD. in his Comment filed on 02/04/2013, as excerpted below.

"In my professional opinion, the FCC should request the EPA to empanel a Working Group composed of health experts who have no conflicts of interest with industry to review the scientific literature on EMR.

The Group should recommend biologically-based EMR standards that ensure adequate protection for the general public and occupational health based upon the precautionary principle. Finally, the FCC should adopt the standards, testing procedures, and appropriate precautionary warning language recommended by the Working Group.

The FCC should not take any actions that may increase exposure of the population to EMR from cell phones, base stations, Wi-Fi, Smart Meters and other RF- or ELF-emitting devices. The FCC must especially protect vulnerable groups in the population including children and teenagers, pregnant women, men of reproductive age, individuals with compromised immune systems, seniors, and workers."

Precautionary Principle; Lynn Beiber Comments, Jul .11, 2016

I'm writing this letter to urge rejection of the 5G technology rollout being voted on this July 14, 2016, during the FCC's Spectrum Frontiers proceeding. I have multiple reasons for this position which I hope you will read and consider.

I have researched extensively, and worked with many others to inform the public about the negative effects of wireless technology. The wireless industry, worth trillions, is dictating public policy and following the play book of big tobacco. Wireless is here to stay. I hold no illusions. However, I do expect and demand that our public policy makers take the necessary, even if costly steps, to inform and protect the public.

Tom Wheeler's sales pitch for 5G cellular technology reads like a bunch of snake oil promises. His remarks to the National Press Club on June 20, 2016 are frightening and I'm not one to be easily scared. Mr. Wheeler says the U.S. Must be first out of the gate in order to win the race. Race for what? I ask.

I find Mr. Wheeler's rhetoric arrogant and sanctimonious. Take off the money goggles and one can see a tecno boondoggle in the making.

Mr. Wheeler wants no time wasted on committees and regulators in order for the the future to be defined. Innovators should be turned loose, he says. Really? Then why do we have an FCC? Does this sound like a way to devise prudent public policy?

Mr. Wheeler paints a rosey picture of a Jetson's World with his Utopian version of wireless interconnectivity. Of course, this all sounds great to the mostly ignorant general population and the profiteers. However, those of us who know the truth want a say in our future. Just because we have the knowledge and ability to create some new technology does not mean that it is necessary and wise. Dr. Frankenstein comes to my mind.

I know Technocracy when I see it and the IoT (Internet of Things), supposedly made better by 5G, is at the heart of it. Technocrats like Tom Wheeler think that hand picked scientists and engineers should make the rules and the rest of us should bow at their feet. How does that work out for the masses when the scientists and engineers are bought and paid for by the industries that profit?

Combine the known but conveniently ignored scientific facts of biological harm from wireless radiation with the demonstrated corruption, and growing carelessness of the FCC and what we have is a nightmare of unintended consequences.

Mr. Wheeler prefers to spin it as a "cornicopia of unanticipated innovative uses". He is good with words but I have no more trust in his leadership at the FCC than I do in any other government agency captured and basically run by the industries they are supposed to be regulating.

How is it that the FCC gets away with using a 20 year old safety "guideline" for cell phone radiation exposure? There are NO standards, just a guideline based on thermal effects after 30 minutes of exposure at a certain distance from a plastic head filled with fluid.

Mr. Wheeler says his 5G proposal is the final piece in the spectrum "Trifecta" of low- band, mid-band and high-band spectrum. Yes, Mr. Wheeler is quite the gambler. The word "Trifecta"

means a bet or betting procedure in which one wins if one correctly picks the first, second and third place finishers in a race. A bet? That's great public policy making for you. It may be a good bet for those who will profit greatly but it's a losing bet for the public. Whatever goes wrong in this grand experiment, the public and the consumers, Mr. Wheeler claims to care about, ultimately pay the price. Whether it's in dollars, health consequences, privacy invasion, interference problems or cyber security, the public pays and pays.

Ever since 1994, when the telecom act, written by the wireless industry, was passed by a Congress deeply on the dole, the corruption has mounted. Why does a section of this act prohibit rejection of cell tower sites based on radiation exposure concerns? The public has been deceived purposefully. Greed is nothing new but the wireless industry, arguably the most profitable industry of all time, has lowered the bar of decency to depths so low it knows no bounds. Profit before People is the mantra of the wireless industry and the FCC and our government, jumped on the band wagon in order to get a piece of this pie in the sky.

A generation of unknowing wireless junkies has been created to support the wireless industries insatiable greed. Public health and safety, privacy, cyber security, reliability and even first responder needs be damned.

Before 1994 assigning spectrum was handled more by engineers through cooperation. Now it's the highest bidder who wins and protection from interference between bands is not "THE" priority. Look at the failure of the D block (700 Megahertz) auctions. The money for the U.S. treasury did not materialize and industry got favors.

I remember that the D Block auction came about because after 911 we were all convinced that we had to change the way TV is broadcast, so first responders could have interoperability. That promise still has not been fulfilled and the interference problems experienced by first responders is getting worse. Just look at the outrageous prices we pay for TV programming now and I think it's obvious we have been conned.

Another example is Verizon, claiming to be concerned for the consumers who don't have access to high speed connectivity, because it's too costly to run fiber to those homes. What happened to all the money and tax breaks that Verizon was awarded in order to build out the fiber optic network they promised? I'll tell you what they did. Verizon built fiber networks only in urban areas where it would be most profitable for THEM and the rest of the country got nothing but the bill. Now, Verizon wants to abandon our most reliable form of communication, copper landlines and is pushing 5G.

Wireless will NEVER have the reliability of wired. I have personally fought with Verizon to keep my copper landline as they try to bully me to go with the fiber optic in my neighborhood. The price was originally tempting but it has gone way up and I'm the only one in my neighborhood with a working phone during a power outage.

Experts who care about our National security have expressed concern over abandoning the copper phone lines. It is the most reliable in a state of national emergency. It is well known that wireless communication and the IoT have created cyber security weaknesses that could threaten the entire power grid.

I am no luddite. I embraced technology like everyone else...until as time passed I saw the

negative effects, both physiological and social. I started questioning and learned the facts. I had no idea that some of the physical symptoms I experienced could be linked to EHS due to EMF/EMR/RF/harmonics and the all the other things associated with not only wireless devices but electrical energy. I took steps to reduce my exposure and my health improved. I got rid of my cordless phones and keep my cell phone turned off and only use for emergency. As a type 1 insulin dependent diabetic since the age of nine (I'm now 58) I've had to be very in tune with my body. My hemoglobin A1c test started improving and my insulin requirements were lowered. I finally figured out why exercising on my treadmill did not lower my blood sugar the way walking around the neighborhood did. I was affected by the EMF from the treadmill. There are studies about this and also something called type 3 diabetes that may be linked to alzheimers.

It was hard to give up the things I did but I was convinced by the scientific studies that I read and the precautionary approach that other countries are taking. The science is there, all one has to do is look for it. How many people actually read, much less know that inside their smart phone is a warning about RF exposure that tells one to keep the phone a certain distance away from the body?

We are just now realizing that it's the long term, cumulative exposure to wireless radiation that is most harmful. Our bodies can only handle so much. Our environment has been bombarded with millions of times more non-ionizing radiation than just a generation ago.

I have been fighting against cell towers at schools and now Tom Wheeler wants to put a mini cell tower for 5G on every lamppost and electric pole? Between smart meters and wi fry everywhere how do we escape?

Lynn Beiber

Precautionary Principle; Kevin Mottus Comments, Sep. 2, 2013

FCC 13-39

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of

Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies ET Docket No. 13-84

Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields ET Docket No. 03-137

To: Office of the Secretary
Federal Communications Commission
Washington, DC 20554

Comment Filed by: (Kevin Mottus)
(11041 Santa Monica Blvd. #627
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(310-479-0299)

August 30 , 2013

JA 10476

AFFIDAVIT OF Kevin Mottus

State of CA]

LA_ County]

I, Kevin Mottus, attest that my statements are true to the best of my knowledge.

Comment round for ET Docket No. 03-137 and ET Docket No. 013-84.

1. My name is Kevin Mottus. My address is 11041 Santa Monica Blvd. #627 Los Angeles, CA 90025.
2. I am a SOCIAL WORKER.
3. The overall cancer rate has remained steady because it was heading down due to the decrease in smoking but no longer. If you look at the numbers more specifically at the 20-29 the group with the highest cell phone use and exposure over time you will see that the cancer rate has increased. You, the FCC and Wireless companies, as represented by the CTIA have manipulated the science studies looking at cancer rates and EMF. You have focused on studies being done for 10 years or less eliminating the key exposure for tumor growth which is seen at 10-15 years. You have grouped very seldom users with heavier users to minimize the effect on heavy users. You have grouped countries with relatively new adoption of wireless technology with countries with more than a decade of use to minimize the obvious correlation between long term use of cells phones and cancer. You have defined heavy use as 30 mins a day for 10 years when no one I know only uses their cell phone for 30 mins a day especially with all of the applications being introduced holding you on the phone longer and longer. But this manipulation and playing with the research ultimately only hurts the innocent end users who become sick

and die due to heavy exposure to RF radiation. You can keep telling people that there is no possible harm and continue to lie to them by manipulating the research but tumors do not lie and they will still get sick and you will still be responsible for this sickness. See all of the studies attached to support this comment/affidavit.

4. No you are marketing your products to children as the tobacco companies use to; this is wrong when you know there is a danger and they are so much more susceptible to the effects of RF radiation. Now you are encouraging people to use their cells longer and longer even though you know that tumor growth is associated with long term heavy use. Verizon and the NFL encouraging people to use their phone for 3 hours at a time the length of game is wrong when such long use has been correlated to disease development with cell users. You have not done studies truly isolating the heavy users with actually average users of 3-6 hours a day. Isolate this group of heavy users and see the causal link between EMF exposure and cancer.

5. You do not really want to see the harmful effects and danger of wireless on people. Our government is in bed with this industry and protecting it is protecting the disease and harm they are causing. Government is not funding studies, Wireless industry is not funding studies. We are not looking for the problem so we are not finding it and we the citizens are paying the price as you experiment on us knowing that this harmful agent will eventually injure some of us with heavy use. But now you are putting WiFi into our classrooms and you are making all of these children heavy users. To promulgate this

technology without safety standards in place is immoral, wrong and criminally malicious giving people cancer that they can die from is absolute evil..

6. To use the lack of research as an excuse for not developing standards and then not do the studies or be sure the studies are not done by independent researchers is irresponsible and evidence of your playing games with the life of our people. To not study the effects of wireless to minimize the health effects on people is criminally wrong as is to prevent the EPA from studying the effects independently as well. To ask the wireless industry to do their own research which if found harmful might put them out of business is a sham and beyond a conflict of interest yet this is what you have done to not protect your people.

7. To have guidelines rather than safety standards and expose 90% of our population to this harmful agent is wrong and you should be held liable in every way. You are playing with the health and well being of us, your citizens. You are playing with the health of our children in schools. You are damaging the genetics of every generation to follow us. There is nothing more selfish and short sighted than this. Why can't our companies do what is right and see that harming our population is going to reduce your customers, workers and future generations as children's reproductive abilities will be effected by so much microwave exposure. This is based on studies with one source of RF radiation but now we are talking about say 8 sources of microwave for some individuals in their home and work environments and even worse for more vulnerable children as well.

8. To continue to deny the existence of non-thermal biological effects from microwave radiation used with wireless in light of thousands of studies showing effects and to ignore

these studies siting that we do not know the exact mechanism of harm is ridiculous; we do not know the exact mechanism of any cancer yet we take measures to minimize our risk but not in this case. Money and profits of the few has blocked our ability to do what is right and care for other Americans as we should. To increase peoples exposure with the proliferation of wireless is irresponsible to the point of being criminal as innocent people develop tumors, suffer and die as a result of exposure. There are no studies ensuring the long term safety of exposure to WiFi and other sources of RF radiation exposure but there are studies showing an association with cancer development with long term and especially heavy use or exposure. Now we are placing our school students in this environment and as LAUSD school board recently stated “we will just see what happens and if there is a problem we will change courses or stop.” But no one is looking at health effects and if they are shown them they are quick to explain them away. What a sad joke our government is that does not protect us but rather partakes in the harming of innocent Americans.

9. All you have to do is ask new victims of brain tumors, eye tumors, salivary gland tumors, breast cancer, ovarian cancer and even anal cancer as more girls carry their cell phones in their bras and back pockets if wireless is safe. But you keep them in the dark about the connection so they just continue to wonder why they and their friends and family are getting cancer. Amazingly bad and evil. We are leaving them unprotected so wireless companies and government agencies can make new revenues with the innocent American paying the price. Just ask Steve Jobs if wireless is safe. Ask Johnie Cochran if wireless is safe? Ask Lebron James who had a tumor removed from his salivary gland if

wireless is safe? Ask all the lesser known innocent business executives, lawyers, salesman who have died or been disabled buy their phone radiating them. You need to come clean and let the public know about the real risks. This is like a self imposed holocaust what you are doing.

10. When are you going to minimize our exposure to microwave rather than maximize it as you are now and putting WiFi with the microwaves bouncing inside of the walls of an airplane how ignorant can you be and to be exposed for hours at a time intensively and to expose special populations: those children, pregnant women and elderly in those planes is just well. This is an impassioned plea for a sane approach fo the sake of the health of our people. We need wired access to the internet and phone rather than wireless as more and more people, children fall victim to cancer as we insist on microwaving them. People try to explain the increase in cancer on what we eat but it is not what we eat because we all eat different things but we are all being microwaved. Essentially, we are the food as we are slowly microwaved by wireless microwave energy day after day hour after hour and with increasing frequency as the FCC paves the way for complete wireless proliferation.

11. God help us. You need to consult with medical scientists not physicists and engineers who know nothing about how these technologies effect the body. How short sighted can you be it will be wireless executive's families, friends, relatives, and colleagues who will get cancer as well as everyone else. It is not like this is something that will only effect the people over here or in this group or that one. Everyone will be effected and health will be impacted though to different degrees. All of us including you

will pay so you can make short term revenue gains. This is the worst of America-greed without remorse or consideration for how it will effect our people. How do you commissioners call yourself Americans?

12. What a joke-your FCC guidelines are a joke. Asking your vendors if they see health effects another big joke. Why not open your records up to scientists so they can track people's heavy use of wireless and tumor growth as well as other health effects. How many people get a brain tumor and call their vendors to complain because of your thorough job lying and misleading the public with billions of dollars of advertising; these poor people with brain tumors do not know to make the connection between their illness and their cell use. You have successfully kept millions of people in the dark about the association between EMF and a variety of illnesses including cancer, immune system disorders and cardiac dysfunction. If they had any idea of the literature that is out there, the thousands of studies and reports they would protect themselves. Your failure to warn the public of the risks is disgraceful. You should have to warn each and every parent with a kid in a wireless classroom of the risks, have to get a signed consent from each passenger sitting in an airplane where WiFi microwaves them the entire flight and you make it easier for their neighbor to also microwave them with their wireless device in dangerous close proximity. You should have to have them each sign a consent stating that they realize that they are being exposed to a class 2B carcinogen. You should have to get permission in writing.

13. The FCC guidelines regulating RF radiation from wireless are inadequate and do not ensure anyone's safety. The guidelines were found not to be protective of public health by Radiofrequency Interagency working group and to continue to use them to ensure the safety of the public is irresponsible and dishonest. FCC guidelines do not cover special populations: children, pregnant women and the elderly all of which make up a large segment of the traveling public being exposed with wireless in airplanes, do not cover children being exposed in their homes by smart meters, and do not cover children, pregnant women and the elderly using cell phones in close proximity all day long. There is no amount of microwaving of children that has been proven to be safe yet you feel safe exposing children all day long in wireless classrooms. Incredibly bad.

14. In contrast the rest of the world has not been corrupted by the revenues the industry brings in and is looking at health effects. The world consensus in and across Europe is to take a precautionary approach and they have recommended a ban of WiFi in children's classrooms due to health concerns. They are not willing to sacrifice their offsprings health merely for quick access to the internet or to save some money to wire internet access. For us to continue to expose our children to a known Class 2b carcinogen for the is irresponsible.

15. How much longer are we going to ignore the Italian Supreme Court ruling that cell phones can cause cancer when they looked at the latest research and taking into account the biased and poor quality research submitted by the wireless industry themselves to obfuscate the truth that wireless can cause cancer. I realize that I am submitting this

impassioned plea to the same group that has carried out this crime against America, humanity but I guess I am hoping you will wake up to the ill of your ways and right your wrongs by warning people, lowering your allowable exposure level to .0001uW/cm² and move to fund effort to provide wired access to the internet and use fiberoptic connections to the internet. I am hoping you will not continue with your inadequate standards, putting the lives of thousands at risk but I guess I am praying that somehow someday you will see the evil in your ways and do the right thing. Pray to god that your loved ones do not suffer the way I have seen so many around me suffer with cancer who are no more than 50 years old. No way you should further put at risk anyone by allowing WiFi or cell phone use on airplanes, in homes, in our communities, covering our community with microwave radiation exposure. We should eliminate it from airports, our homes, schools, hospitals as we have smoking and treat microwave radiation as the carcinogen that it really is.

16. So let me understand that I cannot keep my cell phone on during take off because the signal is so strong that it can interfere with the instrumentation and take off of the airplane but it is okay to have it on and radiating me with the cell phone of the guy next to me? What a sad uncaring unempathetic joke. It is clear the tremendous influence money has. You buy your FCC appointments with political contributions. Then you influence research by buying your own research. You pay universities to stop doing research which is beginning to show the health effects of wireless. This is a corrupt country and corrupt government and all of it is legal and corporate and proper but the only problem is people get sick and die as a result of your legally corrupt actions to hide

the cancerous effects of wireless. You pay enough money you can hurt anyone and in this case hurt thousands. Wholly conflict of interest. The FCC composed of wireless executives. It is a conflict if one of these members took money from the industry but worse yet they are the industry and will be paid handsomely as soon as they get done serving. This is blood money as others fall to cancer.

17. You are taking advantage of the technical naivete of the American public and abusing the trust that the public has that government will act to protect them rather than serve the interests of the wireless companies. What you are doing is un-American domestic terrorism, corporate murder with our government as an accomplice. You knew about this since at least 1992 when the EPA made their 500 page report on EMF's and cancer and other significant illness. In addition, naval records show you knew about the effects of non ionizing radiation 40 years ago. You have known all along but chosen to hide the truth from the American public. With the 400 page report in 1992 from the EPA, you just ignored the studies, defunded this department and then asked the wireless companies to fund and do their own research. How naïve can you be? You did this because you knew the reality that you had grown an industry who at its core has a technology that is carcinogenic and harmful what is sad is that you are selling cells as a means to security and comfort to family and children. You need to be exposed but more importantly you need to be held responsible for all the pain, suffering you have caused and the lives you have ended. Premeditated murder. Thoughtful, well planned out, well financed murder.

18. Antedotal stories are appropriate because no one is asking the doctors what they are seeing as they see sharp increases in cancer amongst young people. No one is honestly informing the public so they can connect the two and report it, and no one is looking at the rates of cancer from the insurance companies who have the facts and so we can see the real increase. We don't look then we do not have to see the devastation you are causing. Not paying for the research so can we can see the real effects and you could levy a \$1fee a month on cell phone use so we could find the safety frequencies and ways to deliver wireless if they are any but certainly do research to ensure the public's safety. make iensure the safety of the public.

19. People really are getting sick from wireless but no one is looking, asking, making the connection for them. It is just being ignored, people left to think they are crazy, and left to suffer and die. Personally I know 4 people with brain tumors right now all under 50 years old; all were very healthy people other than their cancer; and all were big wireless users. One a producer who used a cell phone to her head for years. I can have her testify if you like. A colleague at work used his cell phone to the head and developed a tumor behind his sinus. Another colleague used a laptop with a wireless card for more than 12 hours a day and developed a brain tumor. Another colleague carried her cell phone in her bra and had a strange cancer in her breast and had to have it removed. We are poisoning our young workforce with this wireless radiation. We are cutting these people down in their prime. All of these people were non-smokers. This wireless microwave radiation is our new carcinogen but three times as lethal as smoking with tumor growth expected after 10-15 years of exposure rather than 30-40 years with exposure to smoking.

20. We are allowing the wireless companies to play with the statistics and manipulate the research while innocent people get cancer. This is as wrong as it gets. When is this going to stop? Now you want to intensely radiate people in another environment? Radiate them inside of a metal container the hull of planes hull where microwaves will bounce and slowly microwave all of us for hours as we fly to our next destination. How ignorant can you be? How much more ignorant can you be. I guess we are finding out. Allowing apps for kids to use with dangerous Ipads; ones that allow the baby to lay on the laptop and be radiated while his mother's voice goes off when he moves. People have no idea how they are putting themselves and their families at risk and are you going to continue to allow this to happen? Where is your decency these are infants? Our next generation.

21. This is like when we let people smoke in the hospital as we used to. But with smoke you could see, smell, feel the danger and try to avoid it but with microwaves the exposure is ubiquitous and the radiating is involuntary. We are very efficiently harming our entire population; how stupid can we be? I guess we are finding out. None of the studies looking at nonthermal effects look at multiple sources of radiation but this is the environment that we are creating. For instance in a house or an airplane, with one person sitting in the airplane or house being able to be radiated by multiple wireless sources around them including the WiFi which will be continually microwaving them, their cell phone if they are using one, a wireless pad if they are using one, the cell phone and wireless device or router of their neighbor etc..

22. I spoke with a doctor who said that it used to be that if you saw one patient with brain cancer in your lifetime as a doctor that was a lot. Now I know 4 people with brain cancer. But no one is looking; no one seems to care about the health of our people. It is your job to care and look out for our health rather than just forward the interests of the wireless industry which is you and blissfully not look at what it is doing to our population. Your biased and closed minded pursuit of ubiquitous exposure of microwave radiation is negligent and evil on its worst level.

23. People are getting sick from the wireless smart meters you are putting on their houses. They are protesting and opting out of smart meters due to deletrious effects of microwave radiation across the nation but you seem oblivious to their suffering, distress and ill health you are creating. Even after hearing after hearing is being held across the nation and thousands of people are testifying to the ill health effects immediately caused by long term effects of microwave radiation on themselves and their families. You are forcing people out of their homes in many cases and for some they feel they have to move out of this country to avoid the effects of microwave energy as they become electrosensitive and unable to travel and live freely in this country. Most are getting sick and have no idea that it is the meter on their house that has been causing it. How do you remain ignorant of the damage you are causing, the interruption to the lives of so many, what happened to our right to the pursuit of peace and happiness?

24. Do we have any rights when we are being microwaved without our permission and exposed to a known class 2b carcinogen in the same class as lead and DDT? Would you knowingly paint the walls of the airplane or our homes or schools or hospitals with lead paint? Or spray our food with DDT on the flight or in our homes or schools? The answer is obviously not but with wireless you are doing even worse because here the agent is ubiquitous, being transmitted through us through us by a very efficient means, and the exposure is constant as we are WiFi'd and exposed to others second hand radiation in oan airplane, at work, in a restaurant. Say no to second hand RF radiation exposure.

Submitted by:

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August 30 , 2013

Precautionary Principle; Mary Paul, Comments, Jul. 13, 2016

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Brief Comment

FCC Commissioners, Millions of people are unable to tolerate wireless frequencies. It is estimated that as much as 10% to 15 % of the population is affected in this way. There is more than enough research from non-industry funded studies to show how harmful electromagnetic fields and radiofrequency radiation are to all life. The FCC has consistently ignored the evidence and failed to carry out its scheduled reassessment of current exposure guidelines. The current guidelines adopted by the FCC are more than 20 years old and have no relevance for the documented harmful biological effects even at very low levels of non-thermal radiation. In 2011 The World Health Organization/IARC classified radiofrequency electromagnetic fields as a Class2B possible human carcinogen. In May of this year, the National Toxicology Program (NTP) at the National Institutes of Health (NIH) published the partial findings of a \$28 million multi-year study of the impact of cell phone radiation on human health. The NTP study found a causal relationship between the radiofrequency radiation emitted by cell phones and the occurrence of malignant brain cancer (glioma). The results were compelling enough to announce them early so that the public could be warned. Description of NTP study: <http://ntp.niehs.nih.gov/results/areas/cellphones/index.html> Published "Partial Findings" of the NTP study: <http://biorxiv.org/content/early/2016/05/26/055699> In May 2015 190 EMF scientists from 39 nations (presently 221 from 41 nations) signed an Appeal calling upon the United Nations, the World Health Organization, and the United Nations Environment Programme, and all member states to develop more protective EMF guidelines and to take precautionary measures to reduce EMF exposure. In February 2016, 105 non-governmental organizations (NGOs) in 23 nations signed a letter of support for the International EMF Scientists Appeal and submitted it to the Secretary General of the UN. These non-governmental organizations, who advocate for greater health and environmental protection from EMF sources (electromagnetic fields and radiofrequency radiation), called upon the UN to recognize that EMF exposure is an emerging health and environmental crisis that requires a high priority response. These NGOs requested a review of currently available EMF exposure information that demonstrates active harm to humankind and nature: a review and revision of current international EMF exposure guidelines and proposals for how they can be lowered, and that precautionary measures must be taken to reduce EMF exposure conditions. The 5G will be even more harmful than the existing wireless infrastructure, requiring a massive amount of antennas. These frequencies do not travel as far as 4G frequencies and will require a massive number of antennas installed in more and more locations. This blanket radiation coverage will make it virtually impossible for anyone to avoid the radiation, especially the more vulnerable – people whose health has already compromised by the existing radiation in the environment, as well as children, pregnant women and the elderly and the infirm. I am asking the Committee to vote against the 5G Spectrum Frontiers on July 14, 2016, which would fast track the release of the more harmful 5G radiation.

Stephanie McCarter Comments, Jul. 11, 2016

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State MN

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Brief Comment

I am in opposition to 5G rollout, because the government has not done any studies on long-term health effects from exposure to 5G spectrum. In May 2016 the NTP showed a statistical increase in rare brain and heart cancers from rats exposed to cell phone radiation below thermal levels, yet the FCC has not done anything to revise its safety guidelines which are thermal based. To roll out 5G without doing studies on health first is NEGLIGENT. My children became sick from 4G LTE cell towers next to their school, and now we have to avoid cell towers. With FCC plan to put MILLIONS of small cells on residential streets, my children will become more ill. Health effects of 5G should be studied, not ignored!

Precautionary Principle; Rebecca Morr Comments, Feb. 4, 2013

The existing safety standards for wireless technology need to be updated before all of us, but especially children, are routinely exposed to additional wireless devices.

Until more conclusive research is available, higher “temporary” standards need to be adopted.

Extensive use of wireless technology is new enough that no one has all of the answers. However, there is already enough research indicating possible health problems to justify health concerns at our current safety standards; and it is research that has been carried out and reviewed by our most highly respected scientists, from our most prestigious universities and organizations. Although the wireless industry and energy companies promoting smart meters would like us to believe otherwise, it is reasonable to have health concerns at current safety limits.

Three such studies are noted below. There are many others.

May 2011: The World Health Organization (WHO) identified cell phones as a class 2B possible carcinogen. The International Agency for Research on Cancer (IARC), a working group of 30 of the world’s top scientists, representing 14 countries, spent seven days studying the mechanics of wireless technology, reviewing all of the existing research, and examining all other relevant data.

The result: Cell phones were designated as a class 2B possible carcinogen.

http://www.iarc.fr/en/media-centre/iarcnews/2011/Intr_Monog102.pdf

May 2012: Yale School of Medicine Researchers determined that exposure to cell phones during pregnancy affects the brain development of offspring, potentially leading to hyperactivity. “Taylor said that further research is needed in humans to better understand the mechanisms behind these findings and to establish safe exposure limits during pregnancy. Nevertheless, he said, limiting exposure of the fetus seems warranted.”

<http://news.yale.edu/2012/03/15/cell-phone-use-pregnancy-may-cause-behavioral-disorders-offspring>

December 2010: A Danish study found a higher incidence of hyperactivity and behavior problems in children whose mothers used cell phones extensively during pregnancy. The behavior of the children will be evaluated again in a few years to see if the problem behaviors persist.

<http://www.webmd.com/baby/news/20101206/cell-phone-use-in-pregnancy-risks-for-child>

These, and other studies, suggest that a “cautionary” approach to exposing our entire population, especially young children, to even more wireless technology, especially wireless devices using pulsed signals, is warranted.

It is well known that infants and young children, whose brains are still developing, are significantly more at risk for damage; yet the standard does not take this fact into account.

Not surprising, health care professionals, as well as scientists, have expressed their concern about the health risks related to wireless technology. The American Academy of Environmental Medicine (AAEM), a group of physicians whose expertise is environmental medicine, has taken a strong stand against smart meters.

<http://aaemonline.org/pressadvisoryemf.pdf>

The fact that many people have reported health problems with smart meters (with amazingly similar symptoms, many of which suggest heart and/or neurological involvement that began immediately after their smart meters were installed) is yet another indication that current safety standards may not be strict enough.

I am not suggesting that wireless technology be banned.

I am asking that:

- * healthy guidelines be set, based on independent studies, in real life situations,
- * the risks are thoroughly examined before involuntarily increasing entire populations to more wireless technology (such as smart meters)
- * the health risks are made public (such as warning labels, when warranted),
- * Stricter standards are set for companies whose policies affect entire populations (smart meters), or companies whose products affect children (baby monitors): and
- * Higher “temporary” standards be adopted until reliable research is available to set healthy standards.

Updated standards need to take into account:

- * the fact that each of us is exposed to multiple sources,
- * the wireless industry is rapidly growing, and the number of exposures will increase exponentially in the future,
- * pulsating signals result in short, but extremely high exposures, and may be extremely harmful, especially to children. (“averaging” the strength of signals is not an acceptable way of determining the relative safety of a device. The highest signal strength needs to be proven safe)
- * infants and children are more susceptible to harm because their nervous systems are just developing,
- * intersecting RF waves create “hot spots,” increasing the potential harm;
- * laboratory studies are not sufficient in determining safety; devices need to be studied in real life situations; and
- * safety standards need to be based on biological effects from independent research, not on industry funded research.

Precautionary Principle; Nancy Baer Comments, Feb. 2, 2013

FCC 12-152

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)

Notice of Proposed Rulemaking)
18 FCC Rcd 13187, 13188 ¶1 (2003))

ET Docket No. 03-137

And)

Service Rules for the Advanced Wireless Services)
H Block---Implementing Section 6401 of the)
Middle Class Tax Relief and Job Creation Act of)
2012 Related to the 1915-1920 MHz and)
1995-2000 MHz Bands ¶53 footnote 95)

WT Docket No. 12-357

To: Office of the Secretary
Federal Communications Commission
Washington, DC 20554

Comment Filed by: (Nancy Baer)
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February 2 , 2013

AFFIDAVIT OF Nancy Baer

State of Arizona]

Yavapai County]

I, Nancy Baer, attest that my statements are true to the best of my knowledge.

Comment round for ET Docket No. 03-137 and WT Docket No. 12-357.

1. My name is Nancy Baer. My address is 245 San Patricio Drive, Sedona, AZ
86336.

2. I am retired. I am a thyroid cancer survivor from having received “therapeutic” x-ray “therapy” to my ears as a child for middle ear infections. My thyroid cancer went undiagnosed for 29 years despite having access to excellent medical care. I am a prime example of what can occur when elected officials fail to exercise “the precautionary principle” before allowing “new” technologies to be used on the public. I have been involved in doing my own research on radiation for many years and electromagnetic and radio frequency since 2011.

3. The Commission’s RF safety rules need to be revised in order to comply with its proposal “to amend its rules to ‘ensure that the public is appropriately protected from any potential adverse effects from RF exposure.’ The Rules need to be based on the findings of the biological studies, of which there are many, and if still in doubt, “the precautionary principle” needs to be applied. I have read a lot of studies over the past 18 months and have also noticed that I am sensitive to a specific frequency emitted by certain large building’s heating and cooling systems.

4. I have read studies indicating that all indicate that EMF/RF is harmful and dangerous because those frequencies are not compatible with the body’s natural average 60 Hz frequencies (2012 BioInitiative Report www.bioinitiative.org, Potential Wireless Effects http://www.emfwise.com/science_details.php and Science Overview <http://www.emfwise.com/science.php>, but there are many more.

The affect that those frequencies have on the body include; disrupting our normal speed of light communication between our approximately 100 trillion cells, breaking the blood/brain barrier, lowering the immune system by interfering with the body's normal Circadian cycle and permanently damages our DNA. It affects all biological entities because animals, birds, bees, flowers and fauna all have bio-electromagnetic processes because the manmade frequencies are incompatible with our bodies.

5. The human body has many frequencies within a range of 60-90MHz depending on location.

“Any movement of an object in any frequency can be changed by an external intervention of another frequency and the frequency of the human body and its cells is of no exception. Sets of frequencies directed at inflicted cells of a certain disease had to have these additional elements defined by very precise data parameters in order to create that desirable impact. Those new elements were added to radio, light and sound devices.”

<http://www.healtone.com/pages/the-human-body-frequency.html>

“In 1992, Bruce Tainio, Tainio Technology, an independent division of Eastern State University in Cheney, Washington, built the first frequency monitor in the world. Tainio has determined that the average frequency of the human body during the daytime is 62-68 Hz. A healthy body frequency is 62-72 Hz. When the frequency drops, the immune system is compromised.

Human Body:

Genius Brain Frequency 80-82 MHz	Thymus Gland is 65-68 MHz	Liver is 55-60 MHz
Brain Frequency Range 72-90 MHz	Heart is 67-70 MHz	Pancreas is 60-80 MHz
Normal Brain Frequency 72 MHz	Lungs are 58-65 MHz	
Human Body: from Neck down 60-68 MHz	Thyroid and Parathyroid glands are 62-68 MHz	
Colds and Flu start at: 57-60 MHz	Receptive to Epstein Barr at: 52 MHz	
Disease starts at: 58 MHz	Candida overgrowth starts at: 55 MHz	
Receptive to Cancer at: 42 MHz	Death begins at: 25 MHz	
Processed/canned food 0.	Dried herbs from 12 to 22 Hz	

<http://justalist.blogspot.com/2008/03/vibrational-frequency-list.html>.

6. The plethora of manmade devices emitting frequencies and bombarding us 24/7 are especially dangerous to those with medical implant devices (MIDs), such as pace makers, defibrillators, neurostimulators (deep brain stimulators) for; Parkinson's disease, Obsessive Compulsive Disorder and Depression, insulin pumps, and hearing aids, etc.

According to Professor Emeritus Gary Olhoeft, there is "No tracking for medical implant devices, but NIH says they have been used widely for more than 40 years, and it is estimated that 8-10% of Americans (20-25 million) currently have such a device.

As our population continues to age, and Diabetes increases, use of MIDs increases, and if nothing is done to stop the dangerous EMF and RF, more and more citizens will need to use health care resources. But, over and above all of that, I believe is a moral imperative that accompanies the function of a public servant. Despite being appointed, I believe you have a moral responsibility to protect us from harm.

7. According to Curtis Bennett, Chief Science Officer, Interprovincial Journeyman Electrician (Red Seal), Building Construction Engineering Technologist, Adjunct Faculty for IHF & GEDI, "The FCC declaring safety is only addressing the meter as an end use device, the rest of the wireless circuit; routers, relays, etc.. were not accounted for or included in the FCC's calculations" (Expert Witness testimony submitted to Brady, TX).

"The discussion on cell phone safety isn't including all of the technical data as was reported to Health Canada's Standing Committee on Health. There was an error reported in Health Canada's Safety Code 6 . . . (*identical to FCC's*) . . . when they compared radio frequency emfs with humans, but didn't provide that humans have their own frequency, or the fact they would be unprotected electrical systems in that application (Exhibit 1).

<http://www.thermoguy.com/blog/index.php?itemid=53>

8. Dietrich Klinghardt, MD, PhD notes that the number of children diagnosed with autism is doubling every five years, largely occurring as a result of being exposed to the high frequency range of cell phones while still a fetus. This is now occurring, by the age of eight, on the average of one out of every 88 births!

http://www.nytimes.com/2012/03/30/health/rate-of-autism-diagnoses-has-climbed-study-finds.html?_r=0

I believe this should be declared a public health crisis immediately as a threat to the continuation of all species.

http://www.klinghardtacademy.com/images/stories/neurotoxin/biological_medicine_notes_by_patricia_lemer_2012.pdf

9. "I analyzed weekly mortality statistics, which the US Centers for Disease Control publish for 122 US cities. Each of dozens of cities recorded a 10% - 25% increase in mortality, lasting 2-3 months, beginning on the day in 1996 or 1997 on which that city's first digital cell phone network began commercial service."

"It is harder to show effects today than 10 years ago because now the entire planet is exposed, making it impossible to do experiments with unexposed controls. But most experiments still show effects such as effects on rhythms, brain waves, blood-brain barrier, sleep, eyes, gonad, skin, hearing, calcium, melatonin, glucose, metabolism, and on human well-being."

- **Arthur Firstenberg**, founder and director of the public advocacy group Cellular Phone Task Force in US, and author of the 1996 book, *Microwaving Our Planet: The Environmental Impact of the Wireless Revolution*

<http://www.alternative-magnetic-therapy.com/emf-experts.html>

10. "I am now convinced those electromagnetic fields pose a health hazard. There is statistical association between magnetic fields and cancer that goes beyond the shadow of reasonable doubt. I think there is clear evidence that exposure to electromagnetic field increases the risk of cancer."

"This is most clear with leukemia and brain tumors. But in residential studies, statistical significance increased for all kinds of cancers. And we are just beginning to have a whole body of evidence that reproductive cancers are increased by exposure."

- **Dr David Carpenter**, Dean of State of New York School of Public Health

10. The US Environmental Protection Agency (EPA) now warns "there is reason for concern" with electromagnetic field and advises "prudent avoidance."

"In all my years of looking at chemicals, I have never seen a set of epidemiological studies that remotely approached the weight of evidence that we're seeing with ELF electromagnetic fields."

- **Martin Halper**, EPA director in an article in *Fortune Magazine*, December 1990

Respectfully submitted by



Nancy Baer

245 San Patricio Drive

Sedona, Arizona 86336

February, 2, 2013

Thermografix Consulting Corporation Blog

For news, information and everything related to the exciting world of thermographic imaging.

EXHIBIT 1

23 Feb
2011

Cell Phone Use After One Hour

Posted by Thermo Guy under General

The discussion on cell phone safety isn't including all of the technical data as was reported to **Health Canada's Standing Committee on Health**. There was an error reported in Health Canada's **Safety Code 6** when they compared radio frequency emfs with humans but didn't provide that humans have their own frequency or the fact they would be unprotected electrical systems in that application.

The method used for cell phone heat is done in a lab, they don't typically get to see the heat because the imaging application exceeds expertise. Here is a picture of before and after cell phone use for one hour. Do you see any changes between sides of the head? Do you see the difference in sides of the neck?

Industry stating to hold the phone a short distance from your head isn't going to work. Can you use your cell phone in a building or basement or car? These frequencies go through walls, roofs, cars and these frequencies go through your head as well as your body. Your brain runs off different frequencies and the mix of the frequencies changes frequencies in the head.

Health Canada uses international safety standards and the law says **if** the tissue is stimulated, experimental studies show it can lead to nerve and muscle depolarization. Human tissue and biologic systems are permeable making it very vulnerable to EMFs. What is it doing to a fetus or reproduction?

People in this discussion need to relate this for what it is, humans are intricate electrical systems and holding an electrical device to their head isn't good for that electrical system. Use a wired headset and keep the phone away from you. The application of the law has changed with the reported error or omission in safety standards, be careful. Have you flown with an airline and they tell you to turn your phone off because it interferes with the communication of the aircraft? It is interfering with your communications. How many men are carrying a radiating device in their pockets next to their baby factory, look at the picture and think of those regions of your body?

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USCA Case #20-1025

Document #1869762

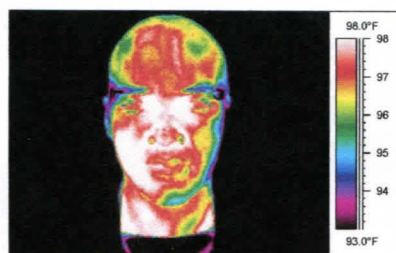
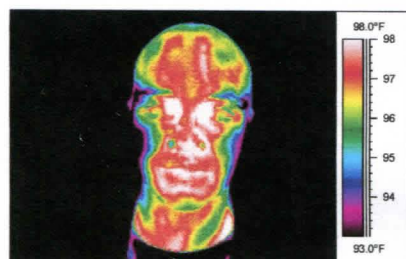
Filed: 11/04/2020

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250-765-9897



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These images are over the same spans of temperatures so you can more easily make references to changes in physiology.

For the same reason we wear lead shield to protect us from x-ray radiation, we need to be aware that cell phone radiation is subtle but a foreign frequency to our body.

COMMENTS

NO COMMENTS YET

ADD COMMENT

This item is closed, it's not possible to add new comments to it or to vote on it

Precautionary Principle; Holly LeGros Comments, Feb. 2, 2013

Currently, I am super hyper sensitive to exposures from various radiofrequency radiation, especially cell phones & cell towers & microwaves. It is critical for those of us who are now having health problems & those who will become health-impacted from this radiofrequency radiation in the future to be more protected from the horrific symptoms & suffering we endure. Please reconsider & revise the current standards to much more restrictive limits for human exposure in order to help prevent & improve the misery & suffering such people do & will endure. This is critical 4 Americans & their loved ones!!! Thank you.

Precautionary Principle; Loe Griffith Comments, Aug. 18, 2013

Comments on Notice of Inquiry, ET Docket No. 13-84

I am a 59 year old former elementary school teacher. I was disabled in 2003. I experience pain, difficulty walking, memory loss, and neuropathy from being around cell phones, wi-fi, smart phones, etc. I cannot get adequate medical care because maintaining the ability to function and communicate in the high EMF environment of medical settings is problematic. I can no longer work, travel, go to church, it is challenging to socialize and I was homeless for several months all due to the pervasiveness of RF radiation. As a former teacher, I especially hate seeing cell towers at schools. There are lots of epidemiological data regarding ill effects in the proximity of towers. I have been injured by and am currently affected by RF radiation that complies with current exposure limits. I urge you to set more restrictive limits.

Loe Griffith
Portal, Arizona

EMR Policy Institute Reply Comments, Nov. 18, 2013

Reply of The EM Radiation Policy Institute
ET Docket No. 03-137 and ET Docket No. 13-84

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of	)	
	)	
Reassessment of Federal Communications	)	ET Docket No. 13-84
Commission Radiofrequency Exposure Limits and	)	
Policies	)	
	)	
Proposed Changes in the Commission's Rules	)	ET Docket No. 03-137
Regarding Human Exposure to Radiofrequency	)	
Electromagnetic Fields	)	

To: Office of the Secretary
Federal Communications Commission
Washington, DC 20554

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November 18, 2013

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I. INTRODUCTION - Massive Support for RF Safety Limits That Protect People

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1. The EM Radiation Policy Institute (EMRPI) endorses and incorporates the hundreds of substantive Comments urging much more restrictive safety limits on radiofrequency radiation (RF) exposure so that humans are actually protected from electromagnetic radiation that harms their health.

2. EMRPI supports biologically-based RF safety limits that are “as low as reasonably achievable” and are at least 100 times lower than present FCC RF safety limits.

3. EMRPI joins with the many physicians, scientists, local governments, groups and trade organizations that have filed Comments urging limits that actually protect human health such as:

- the International Brotherhood of Electrical Workers (750,000 members)
- the American Academy of Pediatrics (60,000 Medical Doctors)
- the American Academy of Environmental Medicine (235 doctors)
- the American Association for Justice (20,000 U.S. members)
- the City and County of San Francisco (population 800,000 plus)
- the National Association of Telecommunications Officers and Advisors (NATOA)
- the Environmental Working Group
- Grassroots Environmental Education
- the Town of Hillsborough
- the Electromagnetic Safety Alliance
- the Center for Electrosmog Prevention
- Martha Herbert MD, PhD, neurodevelopment specialist at Harvard Medical School
- Om Gandhi PhD, Professor of Electrical and Computer Engineering, University of Utah
- Cindy Sage MA, Co-editor of *The BioInitiative Reports 2007 and 2012*
- Martin Blank PhD, Columbia University Department of Physiology and Cellular Biophysics
- David Carpenter MD, Director of The Institute for Health and the Environment, SUNY Albany
- Magda Havas PhD, Trent University, Ontario
- Devra Davis PhD, Environmental Health Trust

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- Susan Brinchman

and many others, most of whom have volunteered their time to file Comments.

4. Numerous additional Commenters echo EMRPI's position, including the petition signed by twenty-six thousand citizens urging stronger cell phone regulation that protects human health.

5. As for any Comments filed urging more lax standards, such Comments are almost entirely made by Industry officials and advocacy groups trained in business, electrical engineering and lobbying.

6. Common sense dictates that those trained in biology, physiology, medicine, and the health scientists are the experts that the FCC should rely upon in order to formulate RF safety limits that protect people from unsafe exposure to EMR.

7. It is illegal for those without a medical license to "practice medicine." People do not go to an electrician for a medical problem. The FDA does not allow the Chemical Industry to dictate doses and types of chemical medications. The FCC should not allow the Industry that benefits from emitting electromagnetic radiation to set the limits for this radiation, particularly in the face of evidence that this radiation interferes with biological processes in numerous harmful ways and interferes with the proper signaling of medical implants.

8. Documentation that EMR at levels below existing FCC safety limits causes harmful biological responses in some humans presented to the FCC should not be ignored. Numerous affidavits document that the Government is forcing unwanted EMR exposure on citizens despite their protests and documented injuries. Neither the Industry nor the Government has the right to "experiment" on the bodies of millions of Americans.

II. CHILDREN

9. Autism rates have greatly increased as EMR emissions have increased. Autism spectrum disorders are linked to EMR/RFR exposures physiologically. See: Martha R. Herbert, Cindy Sage, Autism and EMF? Plausibility of a pathophysiological link - Parts I and II, published in *Pathophysiology*. **Exhibits 1 and 2** These reports state that, "The evidence is sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure

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levels now known to be biologically disruptive, and strong, interim precautionary practices are advocated.”

10. FCC’s current RF safety limits are inaccurate for protecting children. The FCC employs an exposure model equivalent to the shape of a 220-lb., 6-feet 2-inch tall male for compliance testing even though published research from the U.S., Japan, Spain, Brazil, France, and Switzerland proves that radiation absorption in children (including the pinna – ear lobe) is two times higher than in adults.

11. The FCC, by treating pinna as an extremity tissue “would allow cell phone radiation at levels that are 8-16 times those allowed presently by the FCC. [U.S. 2004] This is because pinna is close to the brain and in fact acts as a conduit for cell phone radiation into the head,” states Om Gandhi PhD, Professor of Electrical and Computer Engineering, University of Utah. He strongly disagrees with Federal Agencies’ conclusion that “classifying the pinna has no practical impact on the human exposure to RF radiation, and is therefore appropriate.” in Comment filed by Grassroots Environmental Education. o/b/o/ Om Gandhi PhD. Also cited by Mary Redmayne, PhD, Standards Australia Committee on Human Exposure to EMR, Scientific Advisor to Environmental Health, etc.

12. Toril Jelter MD submits striking case histories of nine children who suffered dramatic adverse health and behavior changes caused by RF radiation exposure. “Over 1% of America’s children now have autism . . . this problem alone threatens to bankrupt whole school systems...Currently, we are performing large-scale experiments on America’s children without informing children or their parents of the risk.”

III. HARMFUL INTERFERENCE

13. EMRPI reiterates that the FCC’s definition of “Harmful Interference” must be expanded if it is to be relevant to the ubiquitous environmental RF radiation exposure now present in Americans’ daily lives.

14. FCC’s “Harmful Interference” definition must be expanded to include acute, chronic, or prolonged exposure to RF signals and emissions that endangers, degrades, obstructs or repeatedly interrupts biological functioning of a person, plant, animal or

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ecosystem, or results in adverse health effects, or malfunctioning of medical devices or equipment. EMRPI Comment page 13 Paragraph 55.

15. “Harmful Interference that results in biological harm” is defined as “any negative change in a measurable biological, physiological or ecological parameter. “

16. The “Harmful Interference” definition must take into account the fact that RF radiation penetrates children and adults differently.

17. “Harmful Interference” affects the 25 million Americans who now depend on implanted medical devices and medical equipment. “Harmful Interference” with a medical device should be defined as:

- a. Exposure to electronics, metal detectors or wireless services that causes an FDA approved medical device such as a cardiac pacemaker, an insulin pump, a deep brain stimulator, a cochlear implant to malfunction and results in pain, bodily harm or death;
- b. Exposure to metal detectors and/or RF signals while a person is in a metal or electronic wheelchair and results in pain, bodily harm, negative health effects or death;
- c. Exposure to metal detectors and/or RF signals to a person with implanted metallic bone replacement devices that results in pain, bodily harm, negative health effects or death.

18. Smart meters are some of the many devices that can cause such “Harmful Interference” that are described in Comments and affidavits filed in this proceeding. Various individuals filed Comments about RF interference with implants that should be heeded. Laddie W. Lawings, retired Naval Nuclear Inspector; Judi Hangarther, RN; Kate Reese Hurd; and Gary Olhoeft, PhD in Geophysics (in the EMRPI Comment).

19. Medtronic, manufacturer of medical implants, warns of harmful interference to implanted medical devices in uncontrolled or controlled environments at current levels.

20. “Cardiac pacemakers, defibrillators, and drug delivery systems...may exhibit improper operation when subjected to strong RF fields. ...It is critical...that any new RF rules...ensure that RF exposure limits below 300 kHz do not cause harmful interference to implanted medical devices....” pg 7 Laddie W Lawings, retired Naval Nuclear Inspector.

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21. The Mayo Clinic advises that cardiac pacemaker patients take precautions to prevent electromagnetic interference with the proper functioning their device:

<http://www.mayoclinic.com/health/pacemaker/MY00276/DSECTION=what-you-can-expect>

IV. COST ANALYSIS

22. The FCC appears to be assuming that there will be a large cost to lowering its current RF safety limits. If setting RF safety limits much more restrictive than the current FCC RF safety limits has a substantial cost, the countries such as Switzerland, Russia, China, and others who use a 0.1 $\mu\text{W}/\text{cm}^2$ RF safety limit would have experienced these costs. No such adverse cost to countries that allow 100 times lower RF safety limits has been substantiated.

23. As for the dollar cost of the health damage caused to millions of Americans from using RF safety limits that allow this radiation to interfere with the health and well-being of citizens, the responsibility and resources for compiling and comparing the dollar cost from lax vs. protective RF safety limits rest on the FCC and relevant Federal Agencies.

24. The EPA should be provided with the extensive Comments on health in this record that indicate damage at the present FCC-allowed levels of RF exposure and asked to provide the dollar value of this damage, insisted upon by the FCC. The FCC can then subtract the documented cost of requiring RF safety limits that are 100 times more protective based on what has happened in the countries using those RF limits and arrive at the cost of not acting to protect human health.

25. Federal Agencies put the economic value of a human life at \$ 6-7.9 million.

<http://www.nytimes.com/2011/02/17/business/economy/17regulation.html?pagewanted=all>

26. Substantial damage occurs when people are disabled from an environmental illness. The Annual Cost to the U.S. of Environmental Illness is between \$57 billion and \$397 billion. Muir & Zegarac-Charyl Zehfus Sept 16, 2013 filing of PMID 11744507 [PubMed-indexed for MEDLINE] PMCID: PMC1240624

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27. Costs of some diseases associated in the peer-reviewed research record with EMR exposure that are found in academic journals and government and foundation resources are:

- Autism - \$137 Billion USD - Xuejun Kong, MD - Christopher McDougale, MD. N. Am J. Med. Sci. 6(3) 2013
- Cancer - \$125 billion USD - (2010) <http://www.ncbi.nlm.nih.gov/pubmed/21228314>
- Cardiovascular Disease - \$444 billion (2010)
<http://www.cdc.gov/chronicdisease/resources/publications/AAG/dhdsp.htm>
- Diabetes – Statistics from the new report of The International Diabetes Foundation:
 1. An estimated 5.1 million people died of diabetes-related complications in 2013.
 2. 17% of babies in 2013 were born to women with high blood sugar levels, a sign of gestational diabetes that will contribute to the global diabetes burden in years to come.
 3. More than 79,000 children developed Type 1 diabetes in 2013; that's up from 77,800 in 2011.
 4. The equivalent of \$548 billion were spent on health care for diabetes patients around the world in 2013.
 5. China, India and the United States top the list for the most cases of diabetes per country; around 24.4 million Americans had the disease in 2013.

28. In addition to the host of diseases linked to EMR at current levels, electrohypersensitivity (EHS), which afflicts 3% of the population, often substantially disables these people.

(Grassroots Environmental Education, Inc. View 97 filed 9/24/13).

29. On October 15, 2013, the French federal agency ANSES (National Agency for Food, Environment and Work Health Security) published an update to its 2009 report (http://www.anses.fr/sites/default/files/documents/PRES2013CPA18EN_0.pdf) on the state of knowledge on risk related to exposure to radiofrequencies “based on a review of the international scientific literature” stating that:

. . . against a background of rapid development of technologies and practices, ANSES recommends limiting the population’s exposure to radiofrequencies – in particular from mobile phones – especially for children and intensive users, and controlling the overall exposure that results from relay antennas. It will also be further developing its work on electro-sensitive individuals, specifically by examining all the available French and international data on this topic that merits attention.

30. Numerous individual Comments on EHS such as Richard Meltzer, Shelley Master, Miriam Weber, M.D. Michele Hertz, Michael Schwaebe, Kevin Mottus, Heather Lane, Scott Spiegel, Kate Reese Hurd, Edna Willadsen, Diane Schou, Deborah Rubin, and many others are of record in this proceeding.

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31. Commenter Kit Weaver presents documentation that Utilities, and others in the smart grid, smart meter and smart home industry are violating the ADA by subjecting people with electromagnetic sensitivity to RF radiation in their own homes. “The FCC should stipulate that no utility, government, or other entity can require installation of an RF-emitting device upon one’s property without consent.”

32. EMRPI strongly opposes the Reply of the Utilities Telecom Council (UTC) that calls for categorical exclusion of Smart Meter facilities from routine evaluation. There is no need to return to the dangerous concept of exclusion by category. There has been no FCC evaluation of the complex emissions scenarios that arise from wireless Smart Meter buildout. The FCC does not know what the radiation patterns and emissions levels are when antennas are clustered on apartment buildings or in neighborhoods where buildings are close to each other.

V. INSURANCE COMPANIES RECOGNIZE SUBSTANTIAL RISK OF DAMAGE CLAIMS

33. Lloyd’s of London is excluding coverage for claims for negative health effects from RF radiation exposure as stated in the submitted affidavit of Michael Schwaebe, Professional Engineer, who swears to physiological effects experience by himself and observed in 13 of his clients:

Two of the world's largest insurance companies, Lloyds and Swiss Re, have recommended to other insurance companies to write in exclusion clauses against paying compensation for illnesses caused by continuous long-term non-ionizing radiation exposure.^[1,2] . The recent Austrian insurance company [AUVA report](#) confirms DNA-breaks caused by non-ionising radiation, but the report leaves many issues open. Remember [what Swiss Re wrote in 2005?](#)

For the insurance industry, this standoff gives rise to an extremely dangerous risk of change composed of two parts: the classical development risk, that is, the possibility that new research findings will demonstrate electromagnetic fields to be more dangerous than has hitherto been assumed; and the sociopolitical risk of change, in other words, the possibility that changing social values could result in scientific findings being evaluated differently than they have been thus far.

Update 24th September: This is bad news for those employers who expose their workers heavily to non-ionising radiation. Precedents: There are already several cases where the worker got compensation because their tumours etc., were caused by [mobile phone](#) & other occupational EMF exposure ^[1,2,3,4,5] . And the amount

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of cases will most likely increase.

<http://beyondradiation.blogs.com/mblog/2010/09/insurance-companies-do-not-cover-health-damage-caused-by-mobile-technologies-disconnect.html>

VI. CONCLUSIONS

34. EMRPI and the endorsed Commenters lay out evidence of widespread present disease and disability with the resultant medical bills and loss of work from over-radiating the public. The future economic impact on young children now being affected will ripple forward in time and amplify as the negative health effects multiply with their cumulative and ever-increasing exposure.

35. The concept that thermal injury is “the only scientifically established mechanism of harm” for EMR and RF effects is simplistic and outdated.

36. Biological Mechanisms are comprised of complex interrelationships at the microscopic level. The FCC must accommodate changes in scientific knowledge found in studies published since 1986 on mechanisms of non-thermal effects of EMR and RF radiation exposure to humans and the environment.

37. The FCC must assess the research needs and gaps relating to potential biological and adverse health effects of wireless communications devices identified in the 2008 National Academies of Science Report 12036.

38. Recent research findings support continuing precautionary actions by various governments and agencies. Current research findings support the concept of biologically-based EMR and RF exposure safety limits.

39. NEPA mandates that it is time for the FCC to establish biologically-based EMR and RF Radiation Safety regulations. The FCC must comply with NEPA requirements.

40. The evidence of the need to revise FCC RF safety limits and exposure regulations to protect all members of the public is overwhelming. The FCC's duty to protect the public is beyond dispute. The Commission has failed to comply with the House Committee on Commerce's mandate to adopt "uniform, consistent requirements, with adequate safeguards of

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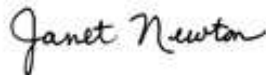
the public health and safety," and that these were to be "established as soon as possible." (H.R. Report No. 104-204, p. 94) This is a core duty imposed on this Commission. The Congressional Committee reiterated this expectation for emphasis on page 95 of House Report 104-204:

The Committee believes the Commission rulemaking on this issue (ET Docket 93-62) should contain adequate, appropriate and necessary levels of protection of the public, and needs to be completed expeditiously.

41. This Congressional statement requires on-going conscientious Commission compliance -- sufficient to protect the public in light of all of the research, health studies and experience now available to the agency.

Respectfully submitted,

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Exhibits

1. Autism and EMF? Plausibility of a pathophysiological link – Part I. Martha R. Herbert, Cindy Sage, Pathophysiology - June 2013 (Vol. 20, Issue 3, Pages 191-209, DOI: 10.1016/j.pathophys.2013.08.001).
2. Autism and EMF? Plausibility of a pathophysiological link – Part II. Martha R. Herbert, Cindy Sage, Pathophysiology - June 2013 (Vol. 20, Issue 3, Pages 211-234, DOI: 10.1016/j.pathophys.2013.08.002).



Exhibit 1

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Autism and EMF? Plausibility of a pathophysiological link – Part I

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Abstract

Although autism spectrum conditions (ASCs) are defined behaviorally, they also involve multileveled disturbances of underlying biology that find striking parallels in the physiological impacts of electromagnetic frequency and radiofrequency exposures (EMF/RFR). Part I of this paper will review the critical contributions pathophysiology may make to the etiology, pathogenesis and ongoing generation of core features of ASCs. We will review pathophysiological damage to core cellular processes that are associated both with ASCs and with biological effects of EMF/RFR exposures that contribute to chronically disrupted homeostasis. Many studies of people with ASCs have identified oxidative stress and evidence of free radical damage, cellular stress proteins, and deficiencies of antioxidants such as glutathione. Elevated intracellular calcium in ASCs may be due to genetics or may be downstream of inflammation or environmental exposures. Cell membrane lipids may be peroxidized, mitochondria may be dysfunctional, and various kinds of immune system disturbances are common. Brain oxidative stress and inflammation as well as measures consistent with blood–brain barrier and brain perfusion compromise have been documented. Part II of this paper will review how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization, how EMF/RFR could contribute to these by de-tuning the organism, and policy implications of these vulnerabilities. Changes in brain and autonomic nervous system electrophysiological function and sensory processing predominate, seizures are common, and sleep disruption is close to universal. All of these phenomena also occur with EMF/RFR exposure that can add to system overload ('allostatic load') in ASCs by increasing risk, and worsening challenging biological problems and symptoms; conversely, reducing exposure might ameliorate symptoms of ASCs by reducing obstruction of physiological repair. Various vital but vulnerable mechanisms such as calcium channels may be disrupted by environmental agents, various genes associated with autism or the interaction of both. With dramatic increases in reported ASCs that are coincident in time with the deployment of wireless technologies, we need aggressive investigation of potential ASC – EMF/RFR links. The evidence is sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure levels now known to be biologically disruptive, and strong, interim precautionary practices are advocated.

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Keywords: Autism; EMF/RFR; Cellular stress; Oxidative stress; Mitochondrial dysfunction; Oscillatory synchronization; Environment; Radiofrequency; Wireless; Children; Fetus

1. Introduction

The premise of this review is that although scant attention has been paid to possible links between electromagnetic fields and radiofrequency radiation exposures (EMF/RFR) and Autism Spectrum Conditions (ASCs), such links probably exist. The rationale for this premise is that the physiological impacts of EMF/RFR and a host of increasingly well-documented pathophysiological phenomena in ASCs have remarkable similarities, spanning from cellular and

oxidative stress to malfunctioning membranes, channels and barriers to genotoxicity, mitochondrial dysfunction, immune abnormalities, inflammatory issues, neuropathological disruption and electrophysiological dysregulation – in short, multi-scale contributors to de-tuning the organism. Additional support may be found in the parallels between the rise in reported cases of ASCs and the remarkable increases in EMF/RFR exposures over the past few decades.

Reviewing these similarities does not prove that these parallels imply causality. Moreover, the physiological processes affected by EMF/RFR are also impacted by other environmental factors, and are known to be present in myriad other chronic illnesses. A set of in-depth reviews on the

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science and public health policy implications of EMF/RFR has been published in a special issue of Pathophysiology 16 (2,3) 2009. This two-volume special issue of Pathophysiology offers a broad perspective on the nature of health impacts of man-made EMFs, documenting biological effects and health impacts of EMFs including genotoxicity, neurotoxicity, reproductive and developmental effects, physiological stress, blood–brain barrier effects, immune system effects, various cancers including breast cancer, glioma and acoustic neuroma, Alzheimer's disease; and the science as a guide to public health policy implications for EMF diseases [1]. Many of these reviews have been updated in the BioInitiative 2012 Report [2], with 1800 new papers added. Further reinforcement is published in seminal research reviews including the two-volume Non-Thermal effects and Mechanisms of Interaction between Electromagnetic Fields and Living Matter, Giuliani L and Soffritti, M (Eds.), ICEMS, Ramazzini Institute, Bologna, Italy (2010) [3]; the World Health Organization INTERPHONE Final Report (2010) [4]; and the WHO International Agency for Research on Cancer RFR Monograph [5] designating RFR as a Group 2B Possible Human Carcinogen. The National Academy of Sciences Committee on Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communication Devices (2008) [6] called for health research on wireless effects on children and adolescents and pregnant women; wireless personal computers and base station antennas; multiple element base station antennas under highest radiated power conditions; hand-held cell phones; and better dosimetric absorbed power calculations using realistic anatomic models for both men, women and children of different height and ages. Yet EMF/RFR does not need to be a unique contributor to ASCs to add significantly to system overload ('allostatic load') and dysfunction [7]. Even so these pathophysiological overlaps do suggest that the potential for an EMF/RFR-ASC connection should be taken seriously, and that their biological fragility may make many with ASCs more likely to experience adverse EMF/RFR impacts. This is a sufficient basis to recommend that precautionary measures should be implemented, that further research should be prioritized, and that policy level interventions based on existing and emerging data should be designed and pursued. Moreover, pursuing this link could help us understand ASCs better and find more ways to improve the lives of people with ASCs and of so many others.

This paper is divided into two parts. Part I (<http://dx.doi.org/10.1016/j.pathophys.2013.08.001>) describes the pathophysiology and dynamism of common behavioral manifestations in autism, and pathophysiological damage to core cellular processes that is associated both with ASCs and with impacts of EMF/RFR. Part II (<http://dx.doi.org/10.1016/j.pathophys.2013.08.002>) reviews how behaviors in ASCs may emerge from alterations of electrophysiological oscillatory synchronization and how EMF/RFR could contribute to these by de-tuning the organism. Part II also discusses public health implications,

and proposes recommendations for harm prevention and health promotion.

2. Physiological pathogenesis and mechanisms of autism spectrum conditions

2.1. How are biology and behavior related?

Appreciating the plausibility of a link between ASCs and EMF/RFR requires considering the relationship between ASC's behavioral and biological features. ASCs were first labeled as 'autism' in 1943 by Leo Kanner, a child psychiatrist who extracted several key behavioral features, related to communication and social interaction challenges and a tendency toward restricted interests and repetitive behaviors [8]. There has been some modification of the characterization of these behavioral features, but ASCs are still defined behaviorally, although sensory issues such as hypo- or hyper-reactivity have recently been included in the diagnostic criteria (Diagnostic and Statistical Manual of Mental Disorders or DSM-V) [9,10].

2.1.1. Transduction is fundamental but poorly understood

To evaluate how an environmental factor such as EMF/RFR could lead to autism and/or influence its severity or incidence, we examine how effects of EMF/RFR exposure may be transduced into changes in nervous system electrical activity, and how these in turn generate the set of behaviors we have categorized as 'autism.' [11] This means not taking behaviors as given, or as purely determined by genetics, but exploring the full range of biology that generates these features and challenges.

2.1.2. More than brain

Although 'autism' has long been considered to be a psychiatric or neurological brain-based disorder [12,13], people diagnosed with ASCs often have many biological features including systemic pathophysiological disturbances (such as oxidative stress, mitochondrial dysfunction and metabolic and immune abnormalities) [14–17] as well as symptomatic medical comorbidities (such as gastrointestinal distress, recurrent infections, epilepsy, autonomic dysregulation and sleep disruption) [18–26] in addition to the core defining behaviors [27]. Because of variability among individuals, the relevance of many of these biological features has been dismissed as secondary and not intrinsically related to the 'autism.'

2.1.3. Heterogeneity: more genetic and environmental than physiological

Presently large numbers of genes and environmental contributors to ASCs are under consideration. Over 800 genes have been associated with ASCs, and over 100 different rare genetic syndromes are frequently accompanied by ASCs, but

no clear unifying mechanism has been identified [28–33]. Similarly, a large number of potential environmental contributors are under investigation ranging from toxicants and Vitamin D deficiency or failure to take prenatal vitamins to air pollution and stress or infection in pregnancy [34–41].

By contrast, a smaller set of disturbances are showing up physiologically as common across substantial numbers of people with ASCs – as well as in myriad other chronic conditions whose prevalence also appears to be increasing [42,43]. These include oxidative stress, inflammation, and mitochondrial dysfunction. EMF/RFR exposure is associated with many of the same biological effects and chronic health conditions [1]. This environmentally vulnerable physiology [44], which may serve as final common pathways triggered by diverse genetic and environmental contributors, will be discussed in Section 3 of Part I as well as in Part II; it may or may not need to rest on underlying genetic vulnerability.

2.1.4. EMF/RFR research may help us understand how ASCs ‘work’

Some correlations between biological and behavioral features have been identified – e.g., a higher level of immune abnormalities correlates with more aberrant behaviors [26,45–50]. In order to move beyond correlations to identifying *mechanisms* by which the *transduction of pathophysiology into behavior* might actually occur, an important component is studying the relationship between systemic pathophysiology and nervous system electrophysiology.

The brain is simultaneously a tissue-based physical organ that can be compromised by cellular pathophysiology as well as altered developmental processes and an information processing system that operates through networks of synchronized electrical oscillations (brain waves) – and EMF/RFR impacts may occur directly at both of these levels. To date the emphasis in ASC research has largely been on ‘structure-function’ relationships that have been anatomy-centered. Thus, exploring how EMF/RFR impacts ASCs may answer questions of how pathophysiological and electrophysiological information-processing interacts.

2.2. Time courses of mechanisms

Researchers have mainly looked for causes of autism in mechanisms that occur early and create permanent change or damage. This approach is logical if one assumes that genetic influences are overwhelmingly predominant, and ‘autism’ is a fixed lifelong trait. However evidence is emerging that ASCs may be more state-like and variable than trait-like and fixed.

2.2.1. Plasticity

A remarkable shift is occurring in conceptual thinking about ASCs and brain plasticity [51]. There are growing numbers of reports of improvement and loss of diagnosis, reversal of neurological symptoms in a growing number of mouse models of genetic syndromes that in humans prominently feature autism [52–62], short-term pharmaceutically-induced

improvement in brain connectivity [63], and transient reversal or abeyance of symptomatology under various circumstances (including fever, fluid-only diet, and certain antibiotic treatments [50,64]). Reversals undermine the idea that ASCs derive from an intrinsically ‘broken brain’, and short time frames of marked improvement cannot be accounted for by remodeling of the brain’s anatomical substrate [65]. ‘Brain waves’ and their synchronization, on the other hand, could easily vary over short time periods.

Also, evidence of average to superior intelligence in most people with autism [66,67], as well as of domains of perceptual superiority [68–76], call into question the assumption that ASCs are intrinsically associated with cognitive deficits.

2.2.2. Mechanisms that operate actively throughout the life-course

EMF/RFR effects can occur within minutes (Blank, 2009) and may, in part, explain clinical reports of ‘intermittent autism’ – for example, some children with mitochondrial disease who have ups and downs of their bioenergetics status ‘have autism’ on their bad days but don’t display autistic features on their good days [77]. These children with their vulnerable, barely compensated mitochondria could very well be teetering right at the brink of a minimally adequate interface of metabolic and electrophysiological dysfunction. Everyday exposures to allergens, infection, pesticide on the school playground, as well as EMF/RFR interference with electrophysiology might reasonably contribute to the bad days. Stabilizing more optimal nervous system performance [78] including through environmental control of excessive EMF/RFR exposure could perhaps achieve more ‘good days’.

2.2.3. Pathophysiology and allostatic load

The model of ‘allostatic load’ – the sum total of stressors and burdens [79] – may be central to understanding how the many risk factors interact to create autism – and to create a spectrum of levels of severity across so many of ASD’s associated features. This accumulation increases chronic stress, and a growing number of papers document indicators of chronic stress in individuals with ASCs (as will be discussed in Part II). The ‘allostatic load’ concept dovetails well with a model of progressive exacerbation of pathophysiological disturbances that occurs in the pathogenesis of many chronic diseases [43]. It is also critical to understand that many different environmental factors converge upon a much smaller number of environmentally vulnerable physiological mechanisms [44], so that large numbers of small exposures may have effects from small numbers of large exposures.

EMF/RFR exposures have demonstrated biological effects at just about every level at which biology and physiology have been shown to be disrupted in ASCs. Further EMF/RFR has been shown to potentiate the impact of various toxicants when both exposures occur together [80]; this may be additive or more than additive. This suggests that EMF/RFR may synergize with other contributors and make things worse. A cascade of exposures interacting with vulnerabilities in

an individual can potentially lead to a tipping point for that person, such as the phenomenon of autistic regression experienced by a substantial subset of people with ASCs.

Just a few decades ago, EMF/RFR exposures were not present in the environment at today's levels. Levels have increased several thousand-fold or more in the past two decades from wireless technology alone; with unplanned side effects from pulsed RFR that is a newly classified Group 2B possible human carcinogen [5]. Nearly six billion people globally own wireless phones. Many millions are exposed to wireless exposures from use of wireless devices and wireless antenna facilities [81]. For this as well as for physiological reasons, 'allostatic loading' as a viable concept for the study of ASCs should reasonably address EMF/RFR as one of the exposures of relevance to the overall stress load, since it is now a chronic and unremitting exposure in daily life at environmentally relevant levels shown to cause bioeffects from preconception and pregnancy through infancy, childhood and the whole life-course.

3. Parallels in pathophysiology

This section will review parallels in pathophysiology between ASCs and impacts of EMF/RFR. It will begin with a review of mechanisms of direct impact and damage at the level of molecules, cells, tissues and genes. It will then move on to consider how these levels of damage lead to degradation of the integrity of functional systems including mitochondrial bioenergetics, melatonin metabolism, immune function and nervous system physiology. The review of parallels concludes with electromagnetic signaling and synchronized oscillation from membranes to nervous system. It will discuss how the ensemble of pathophysiological disturbances, which are themselves final common pathways that can be caused or worsened by many stressors, combine to converge upon electrophysiology. This leads to the implication that 'aberrant' neural systems and somatic function and behaviors might be better understood as consequences or 'outputs' of disturbed underlying physiology to which EMF/RFR is a plausible contributor.

3.1. Damage: means and domains

ASCs have been conceptualized as 'neurodevelopmental' which has focused attention on how genes and environment could alter brain development. This leads to the unstated presumption that virtually everything important about the brain in ASCs has to do with differences in the way it was formed, and that all "malfunction" derives from this "malformation." In genetics this has led to a hunt for neurodevelopmental genes. There is no question that environmental impacts can alter brain development, and impact brain function across the lifespan.

However the influence of the environment on neurodevelopmental conditions such as ASCs does not stop there.

Evidence is accumulating showing that increased expression of genes associated with physiological dysregulation, as well as *single-nucleotide polymorphisms* (SNPs) associated with these issues, may be if anything more prominent than alterations of 'neurodevelopmental' genes [82]. In a study of gene expression in ASCs, Down syndrome and Rett syndrome, these authors state, "(O)ur results surprisingly converge upon immune, and not neurodevelopmental genes, as the most consistently shared abnormality in genome-wide expression patterns. A dysregulated immune response, accompanied by enhanced oxidative stress and abnormal mitochondrial metabolism seemingly represents the common molecular underpinning of these neurodevelopmental disorders." Others have also found pathophysiology-related genes as figuring most prominently in alterations of gene expression in ASC [83–86]. SNPs associated with methylation abnormalities, impaired glutathione synthesis and mitochondrial dysfunction also have been identified as significant risk factors.

Genetics may create risk, but the actual nervous system and health consequences probably come from dysfunction at the physiological level. As mentioned, evidence for pathophysiological dysfunction in ASCs increasingly abounds. In particular, a growing body of evidence widely reported in both the EMF/RFR and ASC literature documents immune aberrations, low total and reduced glutathione levels, lower activity of the anti-oxidative stress system and mitochondrial dysfunction. These phenomena may be both genetically and environmentally modulated. As will be discussed further below, they are certainly pertinent to the neurodevelopment of the brain, which has been by far the dominant focus autism research, but it does not stop there as they can significantly modulate brain function in real time, as well as shape the function of the entire organism, including the autonomic system, the cardiovascular, endocrine, immune, gastrointestinal and reproductive systems and more. These systemic impacts may in turn feed back into the nervous system, modulating how it functions.

3.1.1. Cellular stress

3.1.1.1. Oxidative stress. Autism (ASC) research indicates that oxidative stress may be a common attribute amongst many individuals with autism. In the past decade the literature on this has moved from a trickle to a flood. Studies document reduced antioxidant capacity, increased indicators of oxidative stress and free radical damage, alterations in nutritional status consistent with oxidative stress, altered lipid profiles, and pertinent changes not only in blood but also in brain tissue. Associations of ASCs with environmental exposures such as air pollution and pesticides are indirectly supportive as well, since such exposures are linked in other literature to oxidative stress [43,87–101].

Reactive oxygen species are produced as a normal consequence of mitochondrial oxidative metabolism as well as other reactions, but when their number exceeds the cell's antioxidant capacity a situation of oxidative stress develops. It

is certainly the case that oxidative stress can be a consequence of exposures to chemical toxicants, or of the interactive impacts of toxicants, nutritional insufficiencies and genetic vulnerabilities. This set of risk factors has received considerable attention for the potential roles each component and various possible combinations could play in causing or exacerbating autism.

Less often mentioned in the ASC pathophysiology literature is that it is also well established that EMF/RFR exposures can be associated with oxidative damage. Published scientific papers that demonstrate the depth of EMF and RFR evidence reporting oxidative damage in human and animal models are profiled by Lai and colleagues [102–104]. These cellular effects can occur at low-intensity, legal levels of exposure that are now ‘common environmental levels’ for pregnant women, the fetus, the infant, the very young child, and the growing child as well as for adults. Electromagnetic fields (EMF) can enhance free radical activity in cells [105,106] particularly via the Fenton reaction, and prolonging the exposure causes a larger increase, indicating a cumulative effect. The Fenton reaction is a catalytic process of iron to convert hydrogen peroxides, a product of oxidative respiration in the mitochondria, into hydroxyl free radical, which is a very potent and toxic free radical [103,104]. Free radicals damage and kill organelles and cells by damaging macromolecules, such as DNA, protein and membrane components.

Further indications of a link to oxidative stress are findings that EMF and RFR at very low intensities can modulate glutamate, glutathione and GABA, and affect mitochondrial metabolism. Alterations in all these substances and processes have been documented in ASCs [25,86,89,90,92,107–127]. On the EMF/RFR side, Campisi et al. (2010) report that increased glutamate levels from 900 MHz cell phone frequency radiation on primary rat neocortical astroglial cell cultures induced a significant increase in ROS levels and DNA fragmentation after only 20 min with pulsed RFR at non-thermal levels [128].

Fragopoulou et al. (2012) conducted proteomics analysis of proteins involved in brain regulation in mice as a consequence of prolonged exposure to EMF [129]. They identified altered expression of 143 proteins, ranging from as low as 0.003-fold downregulation up to 114-fold overexpression with affected proteins including neural function-related proteins including Glial Fibrillary Acidic Protein (GFAP), alpha-synuclein, Glia Maturation Factor beta (GMF), apolipoprotein E (apoE), heat shock proteins, and cytoskeletal proteins (i.e., neurofilaments and tropomodulin), as well as proteins of brain metabolism such as aspartate aminotransferase and glutamate dehydrogenase. The authors pointed out that oxidative stress was consistent with some of these changes.

Aberrations in glutathione metabolism and deficiencies in reserves of reduced glutathione are increasingly associated with ASCs, both systemically and in the brain. The parallel with EMF/RFR impacts here is strong, since glutathione reduction associated with EMF/RFR is reported in at least

twenty three relevant research studies in both human and animal studies since 1998, including the following citations [130–144]. It is increasingly appreciated that glutathione is a final common pathway, a critical piece of environmentally vulnerable physiology, as glutathione reserves are compromised by an enormous number of environmental stressors, so that the cumulative impact upon glutathione may be far greater than could be predicted by the magnitude of any specific exposure [145], which supports an ‘allostatic loading’ model.

Also of note are studies showing that the effects of EMF/RFR can be reduced by supplementation with antioxidants and radical scavengers. As an example, Vitamins E and C reduced adverse impacts on rat endometrium from 900 MHz EMR exposure [137]. Ginkgo biloba has also prevented mobile phone-induced increases in malondialdehyde and nitric oxide levels in brain tissue as well as decreases in brain superoxide dismutase and glutathione peroxidase activities and increases in brain xanthine oxidase and adenosine deaminase activities, and treated rats were spared the histopathological cell injury found in the untreated rats [146]. Substantial further literature on antioxidants and radical scavengers is reviewed in Belyaev’s contribution to the Bioinitiative 2012 Report [147].

3.1.1.2. Stress protein (heat shock protein) responses.

Another well-documented effect of exposure to low-intensity extremely low frequency and RFR is the creation of stress proteins (heat shock proteins) indicating that a cell is being placed under physiological stress [148–154]. Heat shock proteins are in a family of inducible proteins that are initiated when any increased need for protection from stray electrons occurs [155,156]. The HSP response is generally associated with heat shock, exposure to toxic chemicals and heavy metals, and other environmental insults. HSP is a signal of cells in distress. Plants, animals and bacteria all produce stress proteins to survive environmental stressors like high temperatures, lack of oxygen, heavy metal poisoning, and oxidative stress. It should also be noted that the generation of HSP stress proteins can have constructive medical applications, such as protection from reperfusion of the heart following ischemic injury [157]. Another concomitant impact of cellular stress can be protein misfolding, which has been documented in association with exposure to EMF/RFR [158,159].

Although a number of papers have demonstrated increases in HSPs in people with ASCs [160–164], it has been investigated far less often than oxidative stress. Part of the research needed to study possible influences of EMF/RFR on ASCs would be more careful study of HSPs in ASCs.

3.1.2. Membranes and channels

3.1.2.1. Cell membranes and lipid peroxidation.

Cell and organelle membranes play roles in partitioning cells from the extracellular milieu as well as in sustaining boundaries and regulating flow of materials between cellular compartments needing different metabolic parameters for their activities.

They also play critical roles in maintaining electrical differences and the flow of electricity.

Adey (2002) summarized studies that report cell membranes as the site of initial field transductive coupling.

“Collective evidence points to cell membrane receptors as the probable site of first tissue interactions with both ELF and microwave fields for many neurotransmitters [165], hormones [166,167], growth-regulating enzyme expression [168–171], and cancer-promoting chemicals [172,173]. In none of these studies does tissue heating appear involved causally in the responses.” [174]

Membranes are well-known targets of oxidative stress. Membrane damage is a major route through which free radical damage proliferates through the cellular system. Lipid peroxidation of membranes most often affects polyunsaturated fatty acids such as EPA and DHA which are the most abundant and vulnerable lipids in the brain where the damage they sustain can have serious impacts – DHA is 40% of PUFAs (brain polyunsaturated fatty acids). Lipid peroxidation of membranes has been identified as an effect of EMF/RFR in multiple studies [175,176]. A variety of other mechanisms for membrane alteration related to EMF/RFR have been intimated in the literature. Physicochemical properties of membranes such as phase transition of phosphatidylcholine can be shifted by non-thermal effects of microwave radiation [177]. Membrane potential and currents may also be impacted by pulsed radiofrequency fields [178]. This has been observed graphically in altered cellular movement in *Paramecium caudatum*, with these cells becoming broader, with a broader-appearing cytopharynx, with their pulse vesicles having difficulty in expelling their content outside the cell, and with less efficient movement of cilia [179] which the authors suggested might be due to targeting of the cellular membrane. The impacts on this unicellular organism may help us imagine what the impact of EMF/RFR might be on cells with some structural similarities, such as columnar epithelial cells and ciliated cells in mucosal surfaces in the respiratory system, digestive tract, uterus and fallopian tubes and central spinal cord.

Indications of lipid peroxidation of membranes has been documented in ASCs, including malonaldehyde and isoprostanes, as well as alteration of membrane phospholipids and prostaglandins [98,100,115,162,180–184]. In one study the isoprostane levels showed a bimodal distribution with the majority of ASC subjects showing moderate increase but a smaller group showing dramatic increases [183]. Thromboxane, reflecting platelet activation, was also elevated in one study [98]. Given that this phenomenon has been identified in many people with ASCs, it is plausible that such individuals will likely be more vulnerable to having such cellular injuries caused, worsened or both by EMF/RFR exposures.

3.1.2.2. Calcium channels. EMF/RFR exposures have been shown to alter or disturb calcium signaling [185] through a variety of mechanisms, including membrane leakage [186],

alteration of calcium-binding proteins and GFAP reactivity [187,188], and altered ultrastructural distribution of calcium and calcium-activated ATPases after exposure [189]. Adey (2002) provided an overview of key studies on calcium efflux and the importance of calcium in cell signaling. *“Early studies described calcium efflux from brain tissue in response to ELF exposures [190,191], and to ELF-modulated RF fields [190–193]. Calcium efflux from isolated brain subcellular particles (synaptosomes) with dimensions under 1.0 μm also exhibit an ELF modulation frequency-dependence in calcium efflux, responding to 16 Hz sinusoidal modulation, but not to 50 Hz modulation, nor to an unmodulated RF carrier [194]. In the same and different cell culture lines, the growth regulating and stress responsive enzyme ornithine decarboxylase (ODC) responds to ELF fields [170,195] and to ELF-modulated RF fields.” [168,170,171,196].*

Dutta et al. (1992) reported:

“Radio-frequency electromagnetic radiation (RFR) at 915 and 147 MHz, when sinusoidally amplitude modulated (AM) at 16 Hz, has been shown to enhance release of calcium ions from neuroblastoma cells in culture. The dose-response relation is unusual, consisting of two power-density “windows” in which enhanced efflux occurs, separated by power-density regions in which no effect is observed. Thus RFR affects both calcium-ion release and AChE activity in nervous system-derived cells in culture in a common dose-dependent manner.” [197]

Alterations in calcium signaling impacts are of central importance in ASC pathophysiology, and have been documented to occur with some EMF/RFR exposures. Calcium channels play an important role in regulating neuronal excitability. Disturbance during development may be contributory to the development of ASCs, and is often associated with vulnerability to seizures. Gene alterations associated with a number of voltage-gated calcium channels have been identified in ASCs [198–202]. However, based on an examination of patient laboratory and phenotype data it has been argued that aberrant calcium signaling could be downstream: Palmieri and Persico (2010) suggest that *“an abnormal neuroimmune response as a relevant player in elevating intracellular Ca^{2+} levels, deranging neurodevelopment, driving oxidative stress, and ultimately affecting synaptic function and neural connectivity especially in long-range neuronal pathways physiologically responsible for integrated information processing” [203].* Peng and Jou (2010) have in turn shown how increased intracellular calcium can cause oxidative stress, and a vicious circle: *“... mitochondrial ROS [reactive oxygen species] rise can modulate Ca^{2+} dynamics and augment Ca^{2+} surge. The reciprocal interactions between Ca^{2+} induced ROS increase and ROS modulated Ca^{2+} upsurge may cause a feedforward, self-amplified loop creating cellular damage far beyond direct Ca^{2+} induced damage” [204].*

Environmental as well as genetic routes to calcium signaling dysfunction have been identified [205] including chemicals such as the polyaromatic hydrocarbons.

PCB-95 in particular modulates the calcium-dependent signaling pathway responsible for activity-dependent dendritic growth [206,207]. In fact, once a genetic mutation has been associated with altering a critical signaling pathway and conferring risk for autism, chemicals or other environmental agents can be identified that target the same pathways and also confer ASC risk. Stamou et al. (2012) have reviewed this strategy of identifying multiple mechanisms converging on common signaling pathways regarding Ca(2+)-dependent mechanisms as well as extracellular signal-regulated kinases (ERK)/phosphatidylinositol-3-kinases (PI3K) and neuroligin-neurexin-SHANK [208]. From this point of view, there may be no particular reason to privilege genetic mutations in their contribution to a disturbance of calcium signaling, since whether this function becomes derailed due to a genetic mutation, from a chemical toxin or from EMF/RFR perturbation of calcium signaling, the functional effect is comparable.

3.1.3. Junctions and barriers

The damage discussed so far has been at the molecular and subcellular level. However impacts from this level reverberate up to larger scales in the system. Where membranes create boundaries between cells and subcellular compartments, barriers do this at a larger scale. Cells become capable of forming barriers between each other through tight junctions which block substances and cells from ‘slipping through the cracks,’ so to speak, between the cells. Conversely, gap junctions are subcellular structures providing openings that allow physical passage of materials between cells otherwise separated by membranes.

Such connections between cells can also be altered by electromagnetic fields and radiofrequency exposures, at least under certain circumstances. High frequency magnetic fields have been observed to be associated with a sharp decrease in intercellular gap junction-like structures, in spite of increased gene expression for pertinent proteins [209]. Changes in tight junctions have been observed upon exposure to microwave and x-ray irradiation [210].

A number of papers in the ASC research field document problems pertinent to junctions. Connexin abnormalities have been documented in neuropathological studies [211] and MacFabe and colleagues identified lipid alterations associated with oxidative stress, membrane fluidity and the modulation of gap junction coupling [212]. Decrease in platelet endothelial cell adhesion molecule-1 were reduced and this reduction correlated with repetitive behavior and abnormal brain growth; adhesion molecules modulate permeability and signaling at the blood–brain barrier as well as leukocyte infiltration into the central nervous system [213].

EMF and RFR might also compromise biologically important barrier structures that separate blood flow from organs like the brain [214]. This raises important questions regarding whether other ‘barriers’ that keep blood flow separate from the gut (gut–blood barrier), or the placenta (blood–placenta barrier) or the eye (ocular–blood barrier) may also be

rendered pathologically leaky, and allow albumin, toxins, pro-inflammatory cytokines and infectious agents to cross these barriers, which may invoke immune responses in the intestines, and may impact the developing fetus [215]. While there are a fair number of negative studies, there are also many studies showing an association between EMF/RFR and pathological leakage of the blood–brain barrier (BBB), as well as evidence in animal studies of damage to brain cells and damage to or death of neurons. Such leakage has been shown to be potentiated by physiological factors such as diabetes and insulin (Gulturk et al., 2010) and has also potentiated viral lethality in a dose-dependent fashion (Lange et al., 1991). Many of the positive findings were associated with non-thermal exposures comparable to normal cell phone radiation exposure [216–222]. There are scattered reports of increased permeability across other membranes and barriers, such as the blood–testicle barrier in mice (Wang, 2008; Wang et al., 2010 and the rat liver canalicular membrane [223]). A 1992 study by Kues et al. reported that “*studies in our laboratory have established that pulsed microwaves at 2.45 GHz and 10 mW/cm² are associated with production of corneal endothelial lesions and with disruption of the blood–aqueous barrier in the non-human primate eye*” [224]. A recent study showing impact of high-frequency electromagnetic fields on trophoblastic connexins [209] may indicate the vulnerability of the placenta and placental barrier function to electromagnetic fields. A thorough review and methodological discussion of literature regarding EMF/RFR impacts on the BBB is provided by Salford in Section 10 of the BioInitiative 2012 Report [214].

BBB integrity can be compromised by oxidative stress which can lead to increased permeability [225], and the resultant extravasation of albumin into brain parenchyma can be excitotoxic and neurotoxic [226,227]. The interaction of these factors may contribute to a feed-forward vicious cycle that can result in progressive synaptic and neuronal dysfunction as seen in various neurodegenerative diseases [228].

The evidence suggesting possible existence of barrier function compromise in people with ASCs is largely indirect. The existence of brain neuroinflammation in ASCs has been documented in a growing number of studies [160,229,230], and this is known to be associated with BBB permeability [231–233]. In a review of clinical MRI findings in ASCs 19/59 showed white matter signal abnormalities [234], which in other settings have been associated with cerebral hypoperfusion, though not necessarily in the same locations as the hyperintensities [235,236]. Blood flow abnormalities, predominantly hypoperfusion, documented in a few dozen PET and SPECT studies, could also be caused by and/or associated with physiological phenomena associated with vascular permeability as will be revisited below. Increased intestinal permeability has been documented (although its absence has also been documented) [237–243] and discussed in the context of food exposures, particularly gluten [244–250]. The reactivity to large numbers of different foods, clinically observed in many children with autism, has been framed by

some as a manifestation of indiscriminate exposure of the immune system and the brain to food proteins on account of intestinal permeability as well as BBB permeability [251]. This reactivity could in turn feed in to aberrant immune responsiveness which in turn could further amplify barrier vulnerability [248].

A number of studies have made an association between an increased risk of having a child with autism and maternal infection during pregnancy. This phenomenon looks like it is a result of the maternal immune system response rather than being due to an impact deriving from a specific infectious agent; but the potential for an accompanying compromise of the placental barrier is also conceivable in this setting. Under these circumstances the fetal risk of exposure to maternal blood toxins, cytokines and stress proteins in utero could potentially be increased if placenta barrier (BPB) function were impaired. The integrity, or compromise thereto, of the maternal-fetal interface via the placenta is an important modulator of brain development [252].

3.1.4. Genetic alterations and reproductive impacts

The overwhelming emphasis in recent decades in autism research has been on genetics, and on finding linkages between genes, brain and behavior, in part because of the high heritability of autism that was calculated from the concordance rates of monozygotic (identical) vs. dizygotic (fraternal) twins found in by a series of small twin studies performed some decades ago. In recent years the genetic premises of this seemingly obvious framing of autism as overwhelmingly genetic have been undermined at several levels [253]. First, the number of reported cases is increasing, making it more difficult to maintain that ASCs are purely genetic because these increases can only be partly explained away by greater awareness or other data artifacts [254,255]. Second, the complexity of the ways we understand how genes might relate to autism has grown, from an expectation a decade ago that a small number of genes (even less than a dozen) would explain everything to an identification of close to a thousand genes associated with autism with common threads linking only a small subset [256,257], as well as ‘de novo’ mutations present in ASC children but not their parents and even ‘boutique’ mutations not shared beyond an individual family. Moreover, a recent twin study that was much larger than any of the prior such studies identified a modest genetic role but a substantial environmental role [258]. Indeed even concordance between identical twins appears to be influenced by whether the twins shared a placenta [259]. All of this calls into question the idea that genetics can be presumed to be the ‘cause’ of autism simply based upon heritability calculations, and upgrades the importance of looking not only at the environment and environmentally vulnerable physiology, but also at acquired mutations.

3.1.4.1. Genotoxicity. Genotoxicity has been proposed as a mechanism for the generation of ‘de novo’ mutations (found in children but not their parents) being found in

ASCs [260]. Reviews and published scientific papers on genotoxicity and EMF report that both ELF-EMF and RFR exposures are genotoxic – i.e., damaging to DNA – under certain conditions of exposure, including under conditions of intermittent and/or chronic ELF and RFR exposure that are of low-intensity and below current world safety standards [104,105,261–266]. Types of genetic damage reported have included DNA fragmentation and single- and double-strand DNA breaks, micronucleation and chromosome aberrations, all of which indicate genetic instability [102,103].

Researchers have recently identified large numbers of de novo mutations, more likely to be transmitted by fathers than by mothers to their children [267–269]. This is consistent with the EMF/RFR literature that repeatedly documents DNA damage to sperm from cell phone radiation (see Section 3.1.4.1.2). The Eichler team at the University of Washington found that 39% of the 126 most severe or disruptive mutations map to a network associated with chromatin remodeling that has already been ranked as significant amongst autism candidate genes [268]. Although the relationship between the prominence of chromatin-related gene mutations and the impacts of EMF/RFR on chromatin condensation has not been clarified, the parallels support further investigation.

3.1.4.1.1. Contributors to genotoxicity.

• Oxidative stress and free radical damage to DNA

Oxidative stress and excessive free radical production are very well known to be potentially genotoxic. They can be a consequence of myriad environmental factors, including but by no means limited to EMF/RFR. The DNA damage that can result could very well be one cause of ‘de novo’ mutations which to date have been found in only a small percentage of individuals with ASCs. Although there is not a consensus at this time about the rates or causes of de novo mutations in ASCs, environmentally triggered oxidative stress and free radical damage that we know are present in large numbers of people with ASCs can be genotoxic, and this warrants a serious investigation of the potential contribution of EMF and RFR to de novo mutations in ASC. Further, the huge increases in exposure to EMF/RFR in daily life due to electrification and the global saturation of RFR from wireless technologies [81] reinforce this need.

• Challenge to DNA repair mechanisms

When the rate of damage to DNA exceeds the rate at which DNA can be repaired, there is the possibility of retaining mutations and initiating pathology. Failure to trigger DNA damage repair mechanisms, or incomplete or failed repair, may be a consequence of a variety of commonplace stressors, including EMF/RFR exposure. A decrease in DNA repair efficiency has been reported to result from exposure to low-intensity RFR in human stem cells, and other cells. Mobile phone frequency GSM exposure at the frequency of 915 MHz consistently inhibited DNA repair foci in lymphocytes [270–272]. Belyaev, Markova and colleagues (2005), and Markova et al. (2009)

reported that very low-intensity microwave radiation from mobile phones inhibits DNA repair processes in human stem cells. A significant reduction in 53BP1 (tumor suppressor p53 binding protein 1) foci was found in cells exposed to microwave radiofrequency radiation within one hour of exposure. Fibroblast cells were impacted in this fashion but adapted over time, whereas stem cells were similarly affected (inhibited 53BP1 foci) but did not adapt to microwave radiation during chronic exposure [270,271]. Additional challenges to DNA repair mechanisms include not only toxicants and other damaging inputs but also nutritional insufficiencies of substances important to the proper functioning of DNA repair mechanisms, including Vitamin D, essential fatty acids, and minerals such as selenium and molybdenum [273]. The high possibility that various such contributors may combine supports an 'allostatic load' model of environmental injury and genotoxicity.

• Chromatin condensation

The work of Markova, Belyaev and others has repeatedly shown that RFR exposure can cause chromatin condensation, which is a hallmark of DNA damage. Belyaev (1997) reported that super-low intensity RFR resulted in changes in genes, and chromatin condensation of DNA at intensities comparable to exposures from cell towers (typically at RFR levels of 0.1 to one microwatt per centimeter squared ($\mu\text{W}/\text{cm}^2$)) [274]. Significant microwave (MW)-induced changes in chromatin conformation were observed when rat thymocytes were analyzed between 30–60 min after exposure to MW [275].

In recent studies, human lymphocytes from peripheral blood of healthy and hypersensitive to EMF persons were exposed to non-thermal microwave radiation (NT MW) from the GSM mobile phones [270,271]. NT MW induced changes in chromatin conformation similar to those induced by heat shock, which remained up to 24 h after exposure. The same group has reported that contrary to human fibroblast cells, which were able to adapt during chronic exposure to GSM/UMTS low intensity RFR exposure, human stem cells did not adapt [272].

3.1.4.1.2. Gonadal and germline impacts. De novo mutations have been shown to be more of a problem related to paternal age [268,276–279], and this may be related to the impact of environmental factors such as EMF/RFR on the stem cell genome, particularly in sperm which have no DNA repair capacity. Vulnerability of testes and ova, and of sperm and egg cells, relates to the tissue milieu in which damage to the germline can take place, as well as on the greater vulnerability of stem cells. Several international laboratories have replicated studies showing adverse effects on sperm quality, motility and pathology in men who use and particularly those who wear a cell phone, PDA or pager on their belt or in a pocket [106,280–284]. Other studies conclude that usage of cell phones, exposure to cell phone radiation, or storage of a mobile phone close to the testes of human males affect sperm counts, motility, viability and structure [175,284,285].

Animal studies have demonstrated oxidative and DNA damage, pathological changes in the testes of animals, decreased sperm mobility and viability, and other measures of deleterious damage to the male germ line [134,286–290]. Of note, altered fatty acids consistent with oxidative stress have been found in sperm cells in male infertility [291,292].

There are fewer animal studies that have studied effects of cell phone radiation on female fertility parameters. Panagopoulous et al. (2012) report decreased ovarian development and size of ovaries, and premature cell death of ovarian follicles and nurse cells in *Drosophila melanogaster* [293]. Gul et al. (2009) report rats exposed to stand-by level RFR (phones on but not transmitting calls) caused decrease in the number of ovarian follicles in pups born to these exposed dams [294]. Magras and Xenos (1997) reported irreversible infertility in mice after five (5) generations of exposure to RFR at cell phone tower exposure levels of less than $1.0 \mu\text{W}/\text{cm}^2$ [295].

3.1.4.1.3. Implications of genotoxicity. The issue of genotoxicity puts the contribution of genetic variation into a different light – as something that needs to be accounted for, not necessarily assumed as the starting point. In this regard it has been speculated that the apparent higher rates of autism in Silicon Valley, discussed in the past as related to 'geek genes' [296], might be conditioned by higher levels of exposure to EMF/RFR. The relationship between the greater vulnerability of male sperm than of female eggs to adverse effects of EMF/RFR exposure and the marked (4:1) predominance of paternal origin of de novo point mutations (4:1 bias), also deserves further careful attention [268].

3.1.5. Implications of damage

We have reviewed parallels between ASC and EMF/RFR in molecular, cellular and tissue damage, including cellular stress (oxidative stress, the heat shock response and protein misfolding), injury of membranes, aberrant calcium signaling, and compromise of cell junctions and barriers. The genotoxicity of EMF/RFR was reviewed in relation to issues of environmental contributions to autism and of the phenomenon of de novo mutations. The compromise of the tissue substrate appears to have many commonalities in ASCs and in EMF/RFR exposures. Also notable was the possibility of attenuating some of the damage through increasing antioxidant status.

Regarding Rett syndrome, a genetic syndrome often associated with autistic behaviors, these commonalities come to mind in considering the implications of a recent study documenting arrest of symptomatology in a mouse model of Rett syndrome through a bone marrow transplant of wild-type microglia [297,298]. The introduction of these competent microglia cells did not directly target the neuronal defect associated with the MECP2 gene mutation; instead the benefits of the transplant were due to overcoming the inhibition of phagocytosis caused by the MECP2 mutation that was absent in the wild-type microglia. Phagocytosis involves removing debris. This suggests that while research has focused on how

specific molecular defects, particularly in the synapse, may contribute to Rett pathophysiology, there may also be an important contribution from cellular debris, misfolded proteins and other disordered cellular structure and function. Such disorder could be accumulating in cells under the conditions of pathophysiological disarray reviewed above. Based on this study as well as on the levels of damage just reviewed, cellular problems that are pertinent to ASCs most likely go beyond any specific defect introduced by a mutation. Additionally it is conceivable that many of the mutations may be not part of normal background variation but instead collateral damage from the same environmental factors that are also driving the damage to the physiology.

3.1.6. Summary of Part I and preview of Part II

The data reviewed above in Part I of this two part paper documents a series of parallels between the pathophysiological and genotoxic impacts of EMF/RFR and the pathophysiological underpinnings of ASCs. DNA damage, immune and blood–brain barrier disruption, cellular and oxidative stress, calcium channel, disturbed circadian rhythms, hormone dysregulation, and degraded cognition, sleep, autonomic regulation and brainwave activity all have commonalities between ASCs and EMF/RFR, and the disruption of disruption fertility and reproduction associated with EMF/RFR may also be related to the increasing incidence of ASCs. All of this argues for reduction of exposures now, and better coordinated research in these areas.

These pathophysiological parallels are laid out after identifying the dynamic features of ASCs that could plausibly arise out of such pathophysiological dysregulation. The importance of transduction between levels was also discussed in Part I, and will be elucidated in much more detail in Part II where more detail will be given about the possible interfaces between the cellular and molecular pathophysiology reviewed above and the higher-level disruption of physiological systems, brain tissue and nervous system electrophysiology.

The emergence of ever larger amounts of data is transforming our understanding of ASCs from static encephalopathies based on genetically caused brain damage to dynamic encephalopathies where challenging behaviors emanate from physiologically disrupted systems. In parallel, the emergence of ever larger bodies of evidence supporting a large array of non-thermal but profound pathophysiological impacts of EMF/RFR is transforming our understanding of the nature of EMF/RFR impacts on the organism.

At present our policies toward ASCs are based on outdated assumptions about autism being a genetic, behavioral condition, whereas our medical, educational and public health policies related to treatment and prevention could be much more effective if we took whole-body, gene-environment considerations into account, because there are many lifestyle and environmental modifications that could reduce morbidity and probably incidence of ASCs as well.

At present our EMF/RFR standards are based on outdated purely thermal considerations, whereas the evidence is now overwhelming that limiting regulations in this way does not address the much broader array of risks and harm now known to be created by EMF/RFR.

In particular, the now well-documented genotoxic impacts of EMF/RFR, placed in parallel with the huge rise in reported cases of ASCs as well as with the de novo mutations associated with some cases of ASCs (as well as other conditions), make it urgent for us to place the issue of acquired as well as inherited genetic damage on the front burner for scientific investigation and policy remediation.

With the rising numbers people with ASCs and other childhood health and developmental disorders, and with the challenges to our prior assumptions posed ever more strongly by emerging evidence, we need to look for and act upon risk factors that are largely avoidable or preventable. We would argue that the evidence is sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure levels causing biological disruption and strong, interim precautionary practices are advocated. Further evidence to support the pathophysiological support for parallels between ASCs and EMF/RFR impacts and for taking action will be offered in Part II.

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