

TO: WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION  
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FROM: Washington Jural Assembly Members  
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COMMISSION

This correspondence consists of our written comments and exhibits regarding the request for comments of: Rulemaking to modify existing consumer protection and meter rules to include Advanced Metering Infrastructure - Docket U-180525.

This correspondence is also giving Lawful Notice and Demand to the WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION and any and all Government, Municipalities, Cities, Townships, Public Officials: This is notice of law as applicable to your corporate and personal financial liability in the event of any violations upon the rights, privileges and immunities of "We the People" of this state which the Washington Jural Assembly represents.

For those on the commission who have never heard of the Washington State Jural Assembly we are a group of state nationals who have come together to work for the rights and safety of the people of this state, which includes you the members of this commission.

Regarding the Opt-in versus Opt-out option, we stand in the Opt-In category in which for the context of advanced meter installation, each customer would be required to contact the company and express their agreement to have an advanced meter installed at their premises. This choice must be made each time a new person moves into the home. Metering choice cannot and should not be an automatic choice.

It is clear from the policy statement put out in July of 2018 that the WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION has ruled for the benefit of the utility corporations instead of for the health, safety and well-being of "We the People" of Washington.

After extensive research on the safety of Smart Meter Technology it is evident that this commission has overlooked one of the most important considerations they should have been concerned with and that is the affect these ELF and radio frequencies have on the public health as well as the health of pets within the home, livestock, farm animals, birds, trees, plants and all living creatures. The numerous public comments reporting unhealthy side effects from exposure to the smart meters should cause a responsible person of authority to look into the current

studies on the effects, specifically, of the radio frequencies these new Smart Meters/Advance Meters are emitting throughout the day.

The research shows without a reasonable doubt that bio effects and some adverse health effects occur at far lower levels of Radio Frequency and ELF exposure than what this commission relied on from studies put out in 2007 by the ICNIRP. (The International Commission on Non-Ionizing Radiation Protection) if that is in fact who they used to gauge the safety of these devices.

A simple search on the internet by commission staff would have discovered this information so it is our contention that either this commission failed to do their due diligence to protect the welfare of the public's health and safety and to educate themselves in this important health information or they disregarded this information in favor of taking the easy path of relying on outdated information put out by the ICNIRP in 2007 which is basically the same exposure thresholds they put out in 1996.

The ICNIRP touts independence from commercial, national and vested interests. ICNIRP's members do not represent their country of origin nor their institute. They cannot hold a position of employment or have other interests that compromise their scientific independence.

Although the ICNIRP does not receive money from industry, its funding stems from subsidies granted by national and international public institutions. These national and public institutions are corporate in nature and they are giving this independent research firm subsidy money to do research. As in so many studies done today the research is unfortunately tainted to favor the institutions that would benefit which are highly influenced by industry. This was the conclusion of the Council of Europe which stated that the ICNIRP was influenced by their benefactors thus making their exposure thresholds they publish highly suspect.

Anyone taking the time to research Smart Meter Technology, becomes aware that the health and safety of the public is never addressed. While researching WUTC data, health and safety data is not present, nor is it contained in the Smart Meter Technology report the utilities are required to file with the WUTC. There is never any mention of the health and safety effects these ELF and Radio Frequencies are giving off from the equipment they are installing across the state, this nation and throughout the world. This is completely unacceptable.

A working group composed of scientists, researchers and public health policy professionals, **The BioInitiative Working Group** ([www.bioinitiative.org](http://www.bioinitiative.org)) has joined together to document the information that must be considered in the international debate about the adequacy (or inadequacy) of existing public exposure standards.

This Report is the product of an international research and public policy initiative to give an overview of what is known of biological effects that occur at low-intensity EMFs exposures (for both radio frequency radiation RF and power-frequency ELF,



and various forms of combined exposures that are now known to be bioactive). The Report examines the research and current standards and finds that these standards are far from adequate to protect public health.

Recognizing that other bodies in the United States, United Kingdom, Australia, many European Union and eastern European countries as well as the World Health Organization are actively debating this topic, the BioInitiative Working Group has conducted an independent science and public health policy review process. The report presents solid science on this issue and makes recommendations to decision-makers and the public.

The clear consensus of the BioInitiative Working Group members is that the existing public safety limits are inadequate for both ELF and RF.

It appears it is the **information** conveyed by electromagnetic radiation (rather than heat) that causes biological changes - some of these biological changes may lead to loss of well-being, disease and even death.

Effects occur at non-thermal or low-intensity exposure levels thousands of times below the levels that federal agencies say should keep the public safe. For many new devices operating with wireless technologies, the devices are exempt from any regulatory standards.

The existing standards have been proven to be inadequate to control against harm from low-intensity, chronic exposures, based on any reasonable, independent assessment of the scientific literature. It means that an entirely new basis (a biological basis) for new exposure standards is needed.

The exposure levels for increased risk are quite low – just above background or ambient levels and much lower than current exposure limits. **The existing ICNIRP limit is 904 mG in the US for ELF.**

Increased risk for childhood leukemia starts at levels almost **one thousand times below** the safety standard. Leukemia risks for young boys are reported in one study to double at only **1.4 mG and above (7)**. Most other studies combine older children with younger children (0 to 16 years) so that risk levels do not reach statistical significance until exposure levels reach **2 mG or 3 mG**. Although some reviews have combined studies of childhood leukemia in ways that indicate the risk level starts at 4 mG and above; this does not reflect many of the studies reporting elevated risks at the lower exposure levels of **2 mG and 3 mG**.

Several recent studies provide even stronger evidence that ELF is a risk factor for childhood leukemia and cancers later in life. In the first study (9), children who were recovering in high- ELF environments had poorer survival rates (a 450% increased risk of dying if the ELF fields were **3 mG and above**). In the second study, children who were recovering in 2 mG and above ELF environments were 300% more likely to die than children exposed to **1 mG and below**. Remember as stated above the acceptable exposure threshold established by the ICNIRP was set

at **904mG** which is almost 1000 times higher. There is little doubt that exposure to ELF causes childhood leukemia. These two studies give powerful new information that ELF exposures in children can be harmful at levels above even 1 mG.

The third study looked what risks for cancer a child would have later in life, if that child was raised in a home within 300 meters of a high-voltage electric power line. (11) For children who were raised for their first five years of life within 300 meters, they have a life-time risk that is **500%** higher for developing some kinds of cancers.

The consequence of prolonged exposures to children, whose nervous systems continue to develop until late adolescence, is unknown at this time. This could have serious implications to adult health and functioning in society if years of exposure of the young to both ELF and RF result in diminished capacity for thinking, judgment, memory, learning, and control over behavior.

In our age of technology where computers systems are being installed in school systems where students are exposed to this wireless field of ELF and RF frequencies it saddens us that the industry has no regard to the health and safety of our youth.

Recent opinions by experts have documented deficiencies in current exposure standards. There is widespread discussion that thermal limits are outdated, and that biologically-based exposure standards are needed.

Everyone knows that wireless "smart" meters communicate via microwaves. What was unknown until now is that additional frequencies are transmitted in the 2 to 50 kilohertz range. Numerous studies have shown repeatedly that those very same frequencies disrupt the human nervous system. Indeed, "nerve block" is the phrase used in the studies to describe what occurs. The studies are not controversial.

In other words, there are no studies that show otherwise. Nerve block induced by frequencies in the 2 to 50 kilohertz range is an established fact. The studies that show this nerve block are all from reputable sources including the epitome of "establishment" science when it comes to electricity, the **Institute of Electrical and Electronics Engineers**.

### **WIRING IN THE HOUSE CAN ACT LIKE AN ANTENNAE RELEASING HARMFUL DIRTY ENERGY**

What's more, a less-well known kind of EMF, known as high-frequency voltage transients, or "dirty electricity." Being a suspected carcinogen these transients are largely by-products of modern energy-efficient electronics and appliances—from computers, refrigerators, and plasma TVs to compact fluorescent lightbulbs and dimmer switches—which tamp down the electricity they use.

This manipulation of current creates a wildly fluctuating and potentially dangerous electromagnetic field that not only radiates into the immediate environment but also can back up along home or office wiring all the way to the utility, infecting



every energy customer in between...This electromagnetic field has been detected with field metering equipment up to 6 feet away from the wiring inside the walls throughout your entire house.

This electromagnetic field essentially charges up the electrons in every cell of your body. Some research suggests that by overlapping the body's signaling mechanisms, transients may interfere with the secretion of insulin, drown out the call and response of the immune system, and cause other physical havoc."

... "Opposite charges attract, and like charges repel. When a transient is going positive, the negatively charged electrons in your body move toward that positive charge. When the transient flips to negative, the body's electrons are pushed back. Remember, these positive-negative shifts are occurring many thousands of times per second, so the electrons in your body are oscillating to that tune. Your body becomes charged up because you're basically coupled to the transient's electric field."...

And, from the second article, at <https://www.prevention.com/electroshocker/index.shtml>:

"A report that cited more than 2,000 studies found that chronic exposure to even low-level radiation (like that from cell phones) can cause a variety of cancers, impair immunity, and contribute to Alzheimer's disease and dementia, heart disease, and many other ailments.

One likely way: EMFs open the blood-brain barrier, causing blood vessels to leak fluid into the brain and damage neurons.

Here is a letter recently sent to the CPUC by engineer Rob States:

Two engineers have been diligently working on Smart Meter dirty power and RF issues – the combined team possess two MS degrees from MIT, a California P.E. license (Professional Engineer's License), and a PhD from Stanford in Electrical Engineering, Magna Cum Laude. They have been working on this nearly continuously for the last four months.

The scientific data tells us that 5% of the population will get sick immediately from RF disease, and another 10% will develop the disease over time. This means about 4.5 million people in California are potential victims.

Since individuals with no history of RF disease are experiencing symptoms the first day the meter is installed, we can assume the meter's RF emissions are not the only problem. The RF network is activated months after initial meter installation.

Extensive measurements have demonstrated that all of the meters measured so far, including ABB, GE, and Landis Gyr, emit noise on the customer's electric wiring in the form of high frequency voltage spikes, typically with an amplitude of 2 volts, but a frequency anywhere from 4,000 Hertz, up to 60,000 Hz.

The actual frequency of the phenomena is influenced by the devices that are plugged into the customer's power. Some houses are much worse than others, and this observation has been confirmed by PG&E installers that have talked to us.

Since 85% of the population is not immediately effected by this phenomena, the knowledge about what is causing symptoms in PG&E's customers will be slow to evolve. We expect word of mouth to be the primary information source since the media is so disconnected from this phenomena.

The scientific literature has studied microwave illness since the 1930's when radar operators became ill. Radar equipment emits radiation that is intermittent, and recent scientific papers have increasingly reported that pulsed radiation is significantly worse than continuous radiation.

Humans have been exposed to continuous microwave transmissions from radio for decades. Exposure that Smart Meters present to California citizens is new and unlike previous electromagnetic emissions.

PG&E has published none of the functional specifications of the meters now being installed, including their BLOCK DIAGRAMS, SCHEMATICS, or BILL OF MATERIALS. The scientific community has been prevented from identifying any of the design problems prior to their installations.

The decisions by PG&E and the CPUC to conduct NO SAFETY STUDIES has forced them to discover the current problem after the meters have been installed and after significant capital has been invested in this project.

Even a rudimentary safety test with 100 randomly selected people would have probably uncovered this problem long before its appearance in PG&E's customer base.

The fix for preventing dirty power disease in PG&E customers is expensive. Because the dirty power must be stopped in the customer's LOW IMPEDANCE house wiring, all of the filter components must handle high power, and therefore are expensive.

Current estimates put the end customer cost at \$500, and that does not include fixing dirty power interactions that Smart Meter causes with devices already in the customer's home, such as computers, FAX machines, copiers, plasma TV's, and the like.

Merely treating 15% of the California households puts the total liability for after market problems at \$2B, approximately equal to the entire cost of the existing program's roll out.

Though the cell phone industry has purchased immunity from liability through their extensive lobbying efforts, the experience of the tobacco and chemical industries



has shown that this immunity can fade as priorities of the general population affects the political process.

Legal liability could force PG&E to approach the CPUC for a doubling of the existing utility rate. This would be a politically untenable request, and could result in the dissolution of the CPUC's existing regulator authority.

The future for both the CPUC and PG&E is uncertain, and potentially disastrous. A prudent course would be to treat the entire Smart Grid project in California as a major risk, and to aggressively engage in damage control.

Rob States, M.S., P.E.  
Chief Engineer, Wave Dry, LLC. 415-927-2739 Office 415-596-2718 Cell

Lookout WUTC. The decisions you make now may affect you later if the reality of the situation is not realized.

While new ELF limits are being developed and implemented, a reasonable approach would be a 1 mG planning limit for habitable space adjacent to all new or upgraded power lines and a 2 mG limit for all other new construction. It is also recommended for that a 1 mG limit be established for existing habitable space for children and/or women who are pregnant (because of the possible link between childhood leukemia and in utero exposure to ELF).

This recommendation is based on the assumption that a higher burden of protection is required for children who cannot protect themselves, and who are at risk for childhood leukemia at rates that are traditionally high enough to trigger regulatory action. This situation in particular warrants extending the 1 mG limit to existing occupied space.

"Establish" in this case probably means formal public advisories from relevant health agencies. While it is not realistic to reconstruct all existing electrical distribution systems, in the short term; steps to reduce exposure from these existing systems need to be initiated, especially in places where children spend time, and should be encouraged.

These limits should reflect the exposures that are commonly associated with increased risk of child hood leukemia (in the 2 to 5 mG range for all children, and over 1.4 mG for children age 6 and younger). Nearly all of the occupational studies for adult cancers and neurological disease report their highest exposure category is 4 mG and above, so that new ELF limits should target the exposure ranges of interest, and not necessarily higher range

Given the scientific evidence at hand the rapid deployment of new wireless technologies that chronically expose people to pulsed RF at levels reported to cause bioeffects, which in turn, could reasonably be presumed to lead to serious health impacts, is of public health concern.

Preventative action is warranted to reduce or minimize RF exposures to the public.

There is suggestive to strongly suggestive evidence that RF exposures may cause changes in cell membrane function, cell communication, cell metabolism, activation of proto-oncogenes and can trigger the production of stress proteins at exposure levels below current regulatory limits.

Resulting effects can include DNA breaks and chromosome aberrations, cell death including death of brain neurons, increased free radical production, activation of the endogenous opioid system, cell stress and premature aging, changes in brain function including memory loss, retarded learning, slower motor function and other performance impairment in children, headaches and fatigue, sleep disorders, neurodegenerative conditions, reduction in melatonin secretion and cancers

This information now argues for thresholds or guidelines that are substantially below current FCC and ICNIPR standards for whole body exposure. Uncertainty about how low such standards might have to go to be prudent from a public health standpoint should not prevent reasonable efforts to respond to the information at hand.

No lower limit for bioeffects and adverse health effects from RF has been established, so the possible health risks of wireless WLAN, WI-FI systems the rollout of the upcoming 5G network, for example, will require further research and no assertion of safety at any level of wireless exposure (chronic exposure) can be made at this time.

The lower limit for reported human health effects has dropped 100-fold below the safety standard (for mobile phones and PDAs); 1000- to 10,000-fold for other wireless (cell towers at distance; WI-FI and WLAN devices). The entire basis for safety standards is called into question, and it is not unreasonable to question the safety of RF at any level.

New regulatory limits for ELF are warranted. ELF limits should be set below those exposure levels that have been linked in childhood leukemia studies to increased risk of disease, plus an additional safety factor. It is no longer acceptable to build new power lines and electrical facilities that place people in ELF environments that have been determined to be risky (at levels generally at 2 mG and above).

A precautionary limit of 0.1 ( $\mu\text{W}/\text{cm}^2$  (which is also 0.614 Volts per meter) should be adopted for outdoor, cumulative RF exposure. This reflects the current RF science and prudent public health response that would reasonably be set for pulsed RF (ambient) exposures where people live, work and go to school.

This level of RF is experienced as whole-body exposure, and can be a chronic exposure where there is wireless coverage present for voice and data transmission for cell phones, pagers and PDAs and other sources of radio frequency radiation.



Some studies and many anecdotal reports on ill health have been reported at lower levels than this; however, for the present time, it could prevent some of the most disproportionate burdens placed on the public nearest to such installations.

Although this RF target level does not preclude further rollout of WI-FI technologies, we also recommend that wired alternatives to WI-FI be implemented, particularly in schools and libraries so that children are not subjected to elevated RF levels until more is understood about possible health impacts.

This recommendation should be seen as an interim precautionary limit that is intended to guide preventative actions; and more conservative limits may be needed in the future.

Bioeffects are clearly established and occur at very low levels of exposure to electromagnetic fields and radio frequency radiation. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. Bioeffects can also occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility 'smart' meters that produce whole-body exposure. Chronic base station level exposures can result in illness.

Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resilience to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from system-wide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions.

### **SCIENTIFIC BENCHMARKS FOR HARM PLUS SAFETY MARGIN = NEW SAFETY LIMITS THAT ARE VALID**

Health agencies and regulatory agencies that set public safety standards for ELF-EMF and RFR should act now to adopt new, biologically-relevant safety limits that key to the lowest scientific benchmarks for harm coming from the recent studies, plus a lower safety margin. Most safety standards are a thousand times or more too high to protect healthy populations, and even less effective in protecting sensitive subpopulations.

**NOTE:** According to the **ICNIRP** (International Commission on Non Ionizing Radiation Protection) commission, which the WUTC relies on to set safe exposure levels to ELF and RF frequencies for the public around the world quotes: "It wishes to emphasize that dose constraints are not to be used or understood as prescriptive regulatory limits."

This statement is a bold example of how an independent research organization fails to take responsibility for the considered safe exposure levels they publish for the population. They post a figure from their studies yet the figure they state is not to

be relied upon as a safe level. What good are they if the level of exposure they publish is relied upon by utility providers as a safe level? And utility providers claim the exposure levels from this organization's studies are safe and that then becomes the industry's standard knowing that this exposure level is 1000 times higher than it should be.

This puts the public at serious health risks and gives the utilities relying on an independent research commission plausible deniability for liability purposes.

The National Toxicology Program found a statistically significant increase in brain cancers from exposure to cell phone frequencies.

<http://ntp.niehs.nih.gov/results/areas/cellphones/index.html>

In 2015, 220 scientists who had published in peer-reviewed journals from 41 nations signed the International Scientists Appeal. Their warnings included cell phones, infrastructure, Wi-Fi, 'smart' meter/grid technology, as well as devices like baby monitors and commercial broadcast uses. [www.emfscientist.org](http://www.emfscientist.org)

The BioInitiative report, updated in 2012 contains nearly 2000 papers reviewed by 29 international scientists from over 20 countries on the health and environmental effects of electromagnetic fields. Their conclusions note that the continued rollout of wireless technologies jeopardizes global health and recommends stricter biologically based standards, lower exposure limits, and a more cautious, science-based approach. [www.bioinitiative.org](http://www.bioinitiative.org)

Unlike the microwave radiation that anti-"smart" meter advocates have been calling attention to for years, there is no scientific dispute regarding the biological effects of 2 to 50 kilohertz frequencies.

The World Health Organization (WHO) classifies wireless radiation as a 2B carcinogen, based on studies linking cell phone radiation to brain tumors! [http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208\\_E.pdf](http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208_E.pdf) Brain tumors are the leading cause of cancer-related deaths in children age 0-14 <http://www.abta.org/about-us/news/brain-tumor-statistics/>.

Not everything is known yet about this subject; but what is clear is that the existing public safety standards limiting these radiation levels in nearly every country of the world look to be thousands of times too lenient. Changes are needed.

Mid-course corrections have been needed ten years ago in the way we accept, test and deploy new technologies that expose us to ELF and RF in order to avert public health problems of a global nature.

New approaches are needed to educate decision-makers and the public about sources of exposure and to find alternatives that do not pose the same level of possible health risks, while there is still time to make changes.



Every day of delay will bring greater liability for the aforementioned corporations and agencies and the individuals involved. It's one thing to act in ignorance, quite another not to act once knowledge is received.

We urge this commission to challenge the electric utility companies and utility equipment manufacturing companies providing smart meter/advanced meters and related equipment to prove to this commission that the ELF and RF frequencies these devices emit throughout a home have been thoroughly researched and tested and to report those findings to a review board of independent engineers to review their findings.

There may be no lower limit at which exposures do not affect us. Until we know if there is a lower limit below which bioeffects and adverse health impacts do not occur, it is unwise from a public health perspective to continue "business-as-usual" deploying new technologies that increase ELF and RF exposures, particularly involuntary exposures. Several studies show cattle affected by environmental EMF exposure. Cows align to geomagnetic field lines and are influenced by ELF EMF. We have also included studies that show the effects of RF signals on trees, insects and birds in the exhibits attached.

Every day of delay will bring greater liability for the aforementioned corporations and agencies and the individuals involved. It's one thing to act in ignorance, quite another not to act once knowledge is received.

As a public official it is your responsibility to be aware of what your constituents are communicating and to respond accordingly.

Whatever happens, we know this much: the American People are now waking up and thinking about this issue like never before, and rapidly gaining momentum.

We ask the WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION to take action to cease and desist any further installments of Smart Meters/Advanced Meters until the evidence can be examined and the true safety of all of the equipment be determined by a board of qualified, independent engineers, for example, Dr. Henry Lai. The question now for you to think about is which side of the fence are you choosing to put your oath of office behind?

We, as members of the Washington Jural Assembly, stand behind the comments made and the facts brought forward to this commission with all due respect. Exhibits are enclosed.

by: Randy Styer © LS

by: Teri Sahm © LS

by: Phyllis Brown © LS

by: Jack Fong © LS

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# Exhibits



## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

Power Density (Microwatts/centimeter <sup>2</sup> - uW/cm <sup>2</sup> )	Reference
As low as (10 <sup>-13</sup> ) or 100 femtowatts/cm <sup>2</sup>	Belyaev, 1997
5 picowatts/cm <sup>2</sup> (10 <sup>-12</sup> )	Grundler, 1992
0.1 nanowatt/cm <sup>2</sup> (10 <sup>-10</sup> ) or 100 picowatts/cm <sup>2</sup>	Belyaev, 1997
0.00034 uW/cm <sup>2</sup>	Behari, 2006
0.0005 uW/cm <sup>2</sup>	Velizarov, 1999
0.0006 - 0.0128 uW/cm <sup>2</sup>	Oberfeld, 2004
0.003 - 0.02 uW/cm <sup>2</sup>	Heinrich, 2010
0.003 to 0.05 uW/cm <sup>2</sup>	Thomas, 2010
0.005 uW/cm <sup>2</sup>	Mohler, 2010
0.005 - 0.04 uW/cm <sup>2</sup>	Thomas, 2008
0.006 - 0.01 uW/cm <sup>2</sup>	Buchner, 2012
0.01 - 0.11 uW/cm <sup>2</sup>	Navarro, 2003

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

Power Density (Microwatts/centimeter <sup>2</sup> - uW/cm <sup>2</sup> )	Reference
0.01 - 0.05 uW/cm <sup>2</sup>	Hutter, 2006
0.005 - 0.04 uW/cm <sup>2</sup>	Thomas, 2008
0.015 - 0.21 uW/cm <sup>2</sup>	Augner, 2009
0.05 - 0.1 uW/cm <sup>2</sup>	Khurana, 2010
0.05 - 0.1 uW/cm <sup>2</sup>	Kundi, 2009
0.07 - 0.1 uW/cm <sup>2</sup>	Otitoloju, 2010
0.38 uW/cm <sup>2</sup>	Schwartz, 1990
0.8 - 10 uW/cm <sup>2</sup>	Akoev, 2002
0.13 uW/cm <sup>2</sup>	Zwamborn, 2003
0.16 uW/cm <sup>2</sup>	Kolodynski, 1996
0.168 - 1.053 uW/cm <sup>2</sup>	Magras & Zenos, 1997
0.2 - 8 uW/cm <sup>2</sup>	Hocking, 1996
0.2 - 8 uW/cm <sup>2</sup>	Hocking, 2000
0.21 - 1.28 uW/cm <sup>2</sup>	Riddervold, 2008

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





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Power Density (Microwatts/centimeter <sup>2</sup> - uW/cm <sup>2</sup> )	Reference
0.5 uW/cm <sup>2</sup>	Saunders, 1981
0.5 - 1.0 uW/cm <sup>2</sup>	Avendano, 2012
1.0 uW/cm <sup>2</sup>	Persson, 1997
1.0 uW/cm <sup>2</sup>	Fesenko, 1999
1.0 uW/cm <sup>2</sup>	Novoselova, 1999
1.0 uW/cm <sup>2</sup>	Eltiti, 2007
1.3 - 5.7 uW/cm <sup>2</sup>	Dolk, 1997
1.25 uW/cm <sup>2</sup>	Pyrpasopoulou, 2004
1.5 uW/cm <sup>2</sup>	Nittby, 2007
2 uW/cm <sup>2</sup>	Kesari, 2008
2.5 uW/cm <sup>2</sup>	Wolke, 1996
2 - 4 uW/cm <sup>2</sup>	D'Inzeo, 1988
4 uW/cm <sup>2</sup>	Tattersall, 2001
4 - 15 uW/cm <sup>2</sup>	Chiang, 1989
5 uW/cm <sup>2</sup>	Boscolo, 2001
5.25 uW/cm <sup>2</sup>	Kwee, 2001
5 - 10 uW/cm <sup>2</sup>	Dumansky, 1974
6 uW/cm <sup>2</sup>	Phillips, 1998

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
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Power Density (Microwatts/centimeter <sup>2</sup> - uW/cm <sup>2</sup> )	Reference
8.75 uW/cm <sup>2</sup>	Marinelli, 2004
10 uW/cm <sup>2</sup>	Navakatikian, 1994
10 - 100 uW/cm <sup>2</sup>	Richter, 2000
12.5 uW/cm <sup>2</sup>	Dutta, 1989
13.5 uW/cm <sup>2</sup>	Sarimov, 2004
20 uW/cm <sup>2</sup>	Mann, 1998
28.2 uW/cm <sup>2</sup>	Yurekli, 2006
37.5 uW/cm <sup>2</sup>	Veyret, 1991
45 uW/cm <sup>2</sup>	Forgacs, 2006
50 uW/cm <sup>2</sup>	Salford, 2003
50 uW/cm <sup>2</sup>	Mann, 1996
60 uW/cm <sup>2</sup>	Somozy, 1991
60 uW/cm <sup>2</sup>	Stankiewicz, 2006
60 uW/cm <sup>2</sup>	Lebedeva, 2000
65 uW/cm <sup>2</sup>	Ivaschuk, 1999
92.5 uW/cm <sup>2</sup>	Belyaev, 2005
100 uW/cm <sup>2</sup>	Elekes, 1996
100 uW/cm <sup>2</sup>	Navakatikian, 1994
120 uW/cm <sup>2</sup>	Salford, 1994

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

Power Density (Microwatts/centimeter <sup>2</sup> - uW/cm <sup>2</sup> )	Reference
500 uW/cm <sup>2</sup>	Intestinal epithelial cells exposed to 2.45 GHz pulsed at 16 Hz showed changes in intercellular calcium. Somozy, 1993
500 uW/cm <sup>2</sup>	A 24.6% drop in testosterone and 23.2% drop in insulin after 12 hrs of pulsed RFR exposure. Navakatikian, 1994
<b>STANDARDS</b>	
530 - 600 uW/cm <sup>2</sup>	Limit for uncontrolled public exposure to 800-900 MHz ANSI/IEEE and FCC
1000 uW/cm <sup>2</sup>	PCS STANDARD for public exposure (as of September 1, 1997) FCC, 1996
5000 uW/cm <sup>2</sup>	PCS STANDARD for occupational exposure (as of September 1, 1997) FCC, 1996
<b>BACKGROUND LEVELS</b>	
0.003 uW/cm <sup>2</sup>	Background RF levels in US cities and suburbs in the 1990s Mantply, 1997
0.05 uW/cm <sup>2</sup>	Median ambient power density in cities in Sweden (30-2000 MHz) Hamnerius, 2000
0.1 - 10 uW/cm <sup>2</sup>	Ambient power density within 100-200' of cell site in US (data from 2000) Sage, 2000

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
0.000064 - 0.000078 W/Kg	Well-being and cognitive function affected in humans exposed to GSM-JMETS cell phone frequencies; RF levels similar near cell sites TNO Physics and
0.00015 - 0.003 W/Kg	Calcium ion movement in isolated frog heart tissue is increased 18% (P<.01) and by 21% (P<.05) by weak RF field modulated at 16 Hz Schwartz, 1990
0.000021 - 0.0021 W/Kg	Changes in cell cycle; cell proliferation (960 MHz GSM mobile phone) Kwee, 1997
0.0003 - 0.06 W/Kg	Neurobehavioral disorders in offspring of pregnant mice exposed in utero to cell phones - dose-response impaired glutamatergic synaptic transmission onto layer V pyramidal neurons of the prefrontal cortex. Hyperactivity and impaired memory function in offspring. Altered brain development. Aldad, 2012
0.0016 - 0.0044 W/Kg	Very low power 700 MHz CW affects excitability of hippocampus tissue, consistent with reported behavioral changes. Tattersall, 2001
0.0021 W/Kg	Heat shock protein HSP 70 is activated by very low intensity microwave exposure in human epithelial amnion cells Kwee, 2001
0.0024 - 0.024 W/Kg	Digital cell phone RFR at very low intensities causes DNA damage in human cells; both DNA damage and impairment of DNA is reported Phillips, 1998
0.0027 W/Kg	Changes in active avoidance conditioned behavioral effect is seen after one-half hour of pulsed radiofrequency radiation Navakatikian, 1994
0.0035 W/Kg	900 MHz cell phone signal induces DNA breaks and early activation of p53 gene; short exposure of 2-12 hours leads cells to acquire greater survival chance - linked to tumor aggressiveness. Marinelli, 2004
0.0095 W/Kg	MW modulated at 7 Hz produces more errors in short-term memory function on complex tasks (can affect cognitive processes such as attention and memory) Lass, 2002
0.001 W/Kg	750 MHz continuous wave (CW) RFR exposure caused increase in heat shock protein (stress proteins). Equivalent to what would be induced by 3 degree C. heating of tissue (but no heating occurred). De Pomerai, 2000
0.001 W/Kg	Statistically significant change in intracellular calcium concentration in heart muscle cells exposed to RFR (900 MHz/50 Hz modulation) Wolke, 1996

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
0.0021 W/Kg	Velizarov, 1999
0.004 - 0.008 W/Kg	Persson, 1997
0.0059 W/Kg	Stagg, 1997
0.014 W/Kg	Kumar, 2012
0.015 W/Kg	Veyret, 1991
0.02 W/Kg	Salford, 2003
0.026 W/Kg	Ivaschuk, 1997
0.0317 W/Kg	Ray, 1990
0.037 W/Kg	Seaman, 1999
0.037 - 0.040 W/Kg	Belyaev, 2008
0.05 W/Kg	Beason, 2002

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
0.09 W/Kg	Aitken, 2005
0.091 W/Kg	Atasoy, 2012
0.11 W/Kg	Kesari, 2010
0.121 W/Kg	Lu, 1999
0.13 - 1.4 W/Kg	Repacholi, 1997
0.14 W/Kg	Elekes, 1996
0.141 W/Kg	Dasdag, 1999
0.15 - 0.4 W/Kg	Chou, 1992
0.26 W/Kg	Kues, 1992
0.28 - 1.33 W/Kg	Chia, 2000
0.3 - 0.44 W/Kg	Krause, 2000
0.3 - 0.44 W/Kg	Preece, 1999
0.3 - 0.46 W/Kg	Schirmacher, 2000
0.43 W/Kg	Salama, 2008

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
0.5 W/Kg	900 MHz pulsed RF affects firing rate of neurons (Lymnea stagnalis) but continuous wave had no effect Bolshakov, 1992
0.58 - 0.75 W/Kg	Decrease in brain tumors after chronic exposure to RFR at 836 MHz Adey, 1999
0.6 - 0.9 W/Kg	Mouse embryos develop fragile cranial bones from in utero 900 MHz. The authors say "(O)ur results clearly show that even modest exposure (e.g., 6 min daily for 21 days)" is sufficient to interfere with the normal mouse developmental process" Fragopoulou, 2009
0.6 and 1.2 W/Kg	Increase in DNA single and double-strand DNA breaks in rat brain cells with exposure to 2450 MHz RFR Lai & Singh, 1996
0.795 W/Kg	GSM 900 MHz, 217 Hz significantly decreases ovarian development and size of ovaries, due to DNA damage and premature cell death of nurse cells and follicles in ovaries (that nourish egg cells) Panagopoulous, 2012
0.87 W/Kg	Altered human mental performance after exposure to GSM cell phone radiation (900 MHz TDMA digital cell phone signal) Hamblin, 2004
0.87 W/Kg	Change in human brainwaves; decrease in EEG potential and statistically significant change in alpha (8-13 Hz) and beta (13-22 Hz) brainwave activity in humans at 900 MHz; exposures 6/min per day for 21 days (chronic exposure) D'Costa, 2003
0.9 W/Kg	Decreased sperm count and more sperm cell death (apoptosis) after 35 days exposure, 2-hr per day Kesari, 2012
< 1.0 W/Kg	Rats exposed to mobile phone radiation on STANDBY ONLY for 11-hr 45-min plus 15-min TRANSMIT mode; 2 times per day for 21 days showed decreased number of ovarian follicles in pups born to these pregnant rats. The authors conclude "the decreased number of follicles in pups exposed to mobile phone microwaves suggest that intrauterine exposure has toxic effects on ovaries." Gul, 2009
0.4 - 1.0 W/Kg	One 6-hr exposure to 1800 MHz cell phone radiation in human sperm cells caused a significant dose response and reduced sperm motility and viability; reactive oxygen species levels were significantly increased after exposure to 1.0 W/Kg; study confirms detrimental effects of RF/MW to human sperm. The authors conclude "(T)hese findings have clear implications for the safety of extensive mobile phone use by males of reproductive age, potentially affecting both their fertility and the health and wellbeing of their offspring." De Iulius, 2009
1.0 W/Kg	Human semen degraded by exposure to cell phone frequency RF increased free-radical damage. De Iulius, 2009

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
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## Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
1.0 W/Kg	Motility, sperm count, sperm morphology, and viability reduced in active cell phone users (human males) in dose-dependent manner. Agarwal, 2008
1.0 W/Kg	GSM cell phone use modulates brain wave oscillations and sleep EEG. Huber, 2002
1.0 W/Kg	Cell phone RFR during waking hours affects brain wave activity. (EEG patterns) during subsequent sleep. Achermann, 2000
1.0 W/Kg	Cell phone use causes nitric oxide (NO) nasal vasodilation (swelling inside nasal passage) on side of head phone use. Paredi, 2001
1.0 W/Kg	Increase in headache, fatigue and heating behind ear in cell phone users. Sandstrom, 2001
1.0 W/Kg	Significant increase in concentration difficulties using 1800 MHz cell phone compared to 900 MHz cell phone. Santini, 2001
1.0 W/Kg	Sleep patterns and brain wave activity are changed with 900 MHz cell phone radiation exposure during sleep. Borbely, 1999
1.4 W/Kg	GSM cell phone exposure induced heat shock protein HSP 70 by 360% (stress response) and phosphorylation of ELK-1 by 390%. Weisbrot, 2003
1.46 W/Kg	850 MHz cell phone radiation decreases sperm motility, viability is significantly decreased; increased oxidative damage (free-radicals) significantly decreased; increased oxidative damage (free-radicals) Agarwal, 2009
1.48 W/Kg	A significant decrease in protein kinase C activity at 112 MHz with 2-hr per day for 35 days; hippocampus is site, consistent with reports that RFR negatively affects learning and memory functions. Paulraj, 2004
1.0 - 2.0 W/Kg	Significant elevation in micronuclei in peripheral blood cells at 2450 MHz (8 treatments of 2-hr each). Trosic, 2002
1.5 W/Kg	GSM cell phone exposure affected gene expression levels in tumor suppressor p53-deficient embryonic stem cells; and significantly increased HSP 70 heat shock protein production. Czyz, 2004
1.8 W/Kg	Whole-body exposure to RF cell phone radiation of 900-1800 MHz 1 cm from head of rats caused high incidence of sperm cell death; deformation of sperm cells; prominent clumping together of sperm cells into "grass bundle shapes" that are unable to separate/swim. Sperm cells unable to swim and fertilize in normal manner. Yan, 2007

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

SAR (Watts/Kilogram)	Reference
2.0 W/Kg	GSM cell phone exposure of 1-hr activated heat shock protein HSP 27 (stress response) and P38 MAPK (mutagen-activated protein kinase) that authors say facilitates brain cancer and increased blood-brain barrier permeability, allowing toxins to cross BBB into brain Leszczynski, 2002
2 W/Kg	900 MHz cell phone exposure caused brain cell oxidative damage by increasing levels of NO, MDA, XO and ADA in brain cells; caused statistically significant increase in 'dark neurons' or damaged brain cells in cortex, hippocampus and basal ganglia with a 1-hr exposure for 7 consecutive days Ilhan, 2004
2.6 W/Kg	900 MHz cell phone exposure for 1-hr significantly altered protein expression levels in 38 proteins following irradiation; activates P38 MAP kinase stress signalling pathway and leads to changes in cell size and shape (shrinking and rounding up) and to activation of HSP 27, a stress protein (heat shock protein) Leszczynski, 2004
2.0 - 3.0 W/Kg	RFR accelerated development of both skin and breast tumors Szmigielski, 1982
2 W/Kg	Pulse-modulated RFR and MF affect brain physiology (sleep study) Schmidt, 2012

STANDARDS	
0.08 W/Kg	IEEE Standard uncontrolled public environment (whole body) IEEE
0.4 W/Kg	IEEE Standard controlled occupational environment (whole body) IEEE
1.6 W/Kg	FCC (IEEE) SAR limit for 1 gram of tissue in a partial body exposure FCC, 1996
2 W/Kg	ICNIRP SAR limit for 10 grams of tissue ICNIRP, 1996

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects





**Percent Comparison Showing Effect vs No Effect in Neurological Effect Studies**

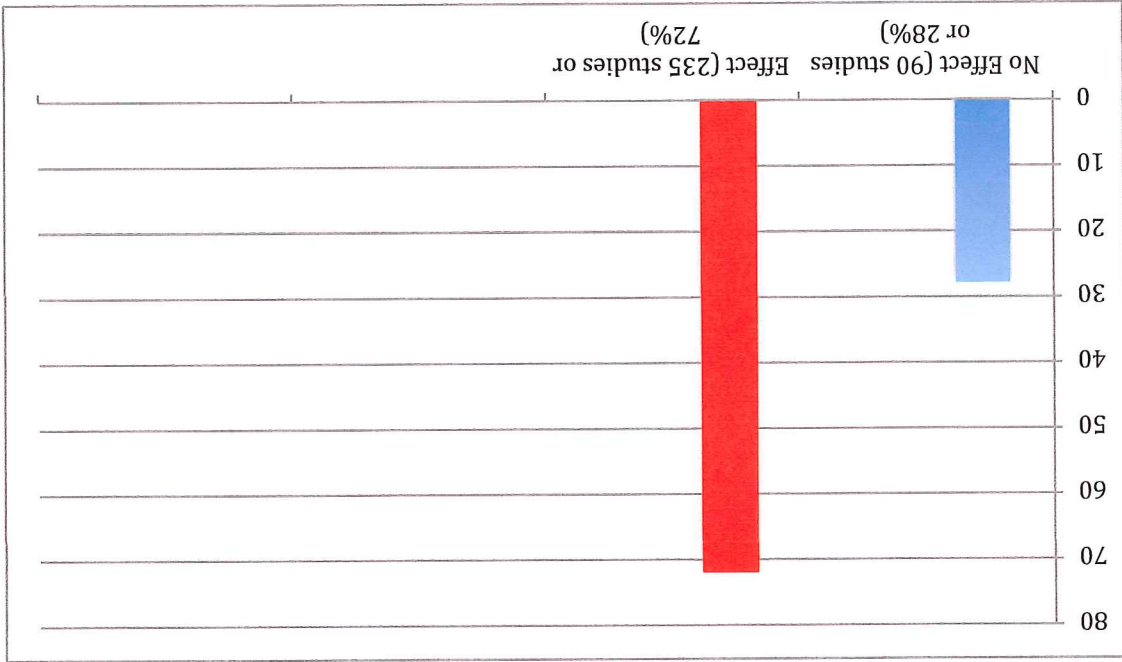
**BioInitiative Report Research Summaries Update, December 2017**  
**Chapter 8, Neurological Effects**

**Neurological Effects of Radiofrequency Radiation**

**Of 325 total studies: (E= 235 (72%); NE= 90 (28%))**

(E = reported effect; NE = reported no significant effect)

**Percent Comparison Showing Effect (Red) vs No Effect (Blue)**







**Percent Comparison Showing Effect vs No Effect in Comet Assay and Oxidative Effects Studies (RFR and ELF-EMF)**

BioInitiative Report Research Summaries Update, November 2017  
Chapter 6, Genotoxic Effects

**RFR Comet Assay**

Of 76 total studies: (E= 49 (64%); NE= 27 (36%))

**ELF EMF Comet Assay**

Of 46 total studies: (E= 34 (74%); NE= 12 (26%))

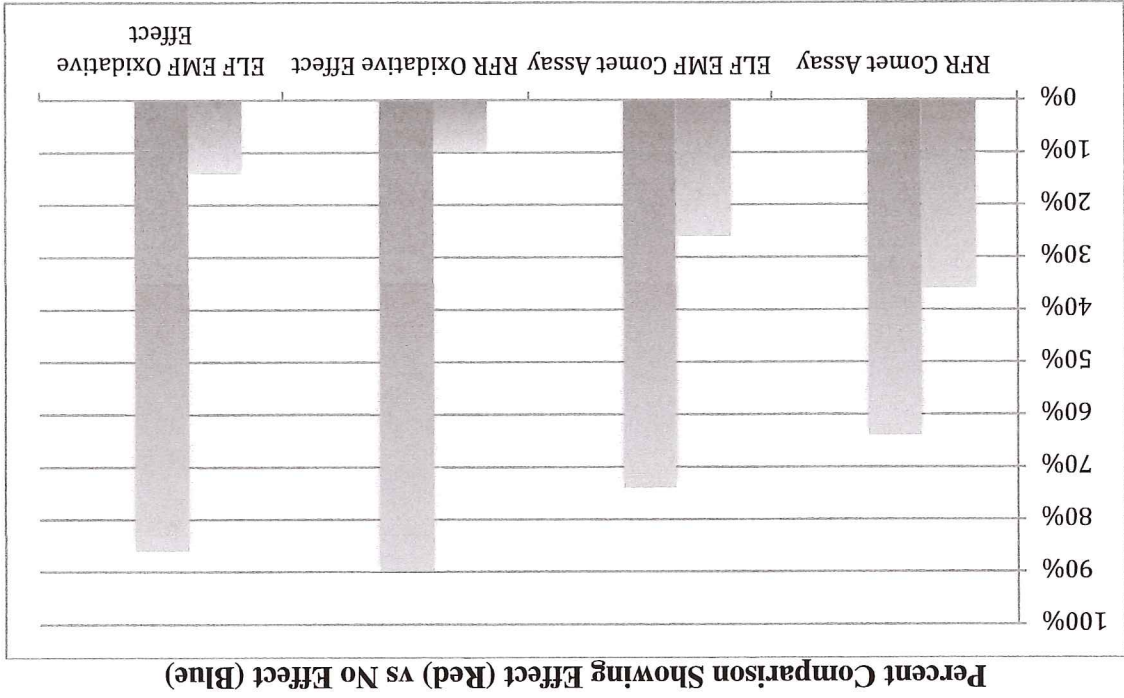
**RFR - Oxidative Effect**

Of 200 total studies: (E=180 (90%); NE=20 (10%))

**ELF - EMF Oxidative Effect**

Of 186 total studies: (E= 162 (87%); NE= 24 (13%))

(E = reported effect; NE = reported no significant effect)







# Conclusions (source: <https://www.bioinitiative.org/conclusions/>)

## **BIOINITIATIVE 2012 – CONCLUSIONS Table 1-1**

Overall, these 1800 or so new studies report abnormal gene transcription (Section 5); genotoxicity and single-and double-strand DNA damage (Section 6); stress proteins because of the fractal RF-antenna like nature of DNA (Section 7); chromatin condensation and loss of DNA repair capacity in human stem cells (Sections 6 and 15); reduction in free-radical scavengers – particularly melatonin (Sections 5, 9, 13, 14, 15, 16 and 17); neurotoxicity in humans and animals (Section 9), carcinogenicity in humans (Sections 11, 12, 13, 14, 15, 16 and 17); serious impacts on human and animal sperm morphology and function (Section 18); effects on offspring behavior (Section 18, 19 and 20); and effects on brain and cranial bone development in the offspring of animals that are exposed to cell phone radiation during pregnancy (Sections 5 and 18). This is only a snapshot of the evidence presented in the BioInitiative 2012 updated report.

## **BIOEFFECTS ARE CLEARLY ESTABLISHED**

Bioeffects are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. Bioeffects can also occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility 'smart' meters that produce whole-body exposure. Chronic base station level exposures can result in illness.

## **BIOEFFECTS WITH CHRONIC EXPOSURES CAN REASONABLY BE PRESUMED TO RESULT IN ADVERSE HEALTH EFFECTS**

Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resilience to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from system-wide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions.

## **LOW EXPOSURE LEVELS ARE ASSOCIATED WITH BIOEFFECTS AND ADVERSE HEALTH EFFECTS AT CELL TOWER RFR EXPOSURE LEVELS**

At least five new cell tower studies are reporting bioeffects in the range of 0.003 to 0.05  $\mu\text{W}/\text{cm}^2$  at lower levels than reported in 2007 (0.05 to 0.1  $\text{uW}/\text{cm}^2$  was the range below which, in 2007, effects were not observed). Researchers report headaches, concentration difficulties and behavioral problems in children and adolescents; and sleep disturbances, headaches and concentration problems in adults. Public safety standards are 1,000 – 10,000 or more times higher than levels now commonly reported in mobile phone base station studies to cause bioeffects.

## **EVIDENCE FOR FERTILITY AND REPRODUCTION EFFECTS: HUMAN SPERM AND THEIR DNA ARE DAMAGED**

Human sperm are damaged by cell phone radiation at very low intensities in the low microwatt and nanowatt/ $\text{cm}^2$  range (0.00034 – 0.07  $\text{uW}/\text{cm}^2$ ). There is a veritable flood of new studies reporting sperm damage in humans and animals, leading to substantial concerns for fertility, reproduction and health of the offspring (unrepaired de novo mutations in sperm). Exposure levels are similar to those resulting from wearing a cell phone on the belt, or in the pants pocket, or using a wireless laptop computer on the lap. Sperm lack the ability to repair DNA damage.

Studies of human sperm show genetic (DNA) damage from cell phones on standby mode and wireless laptop use. Impaired sperm quality, motility and viability occur at exposures of 0.00034  $\text{uW}/\text{cm}^2$  to 0.07  $\text{uW}/\text{cm}^2$  with a resultant reduction in human male fertility. Sperm cannot repair DNA damage.

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 (Agarwal et al, 2008; Agarwal et al, 2009; Wdowiak et al, 2007; De luliis et al,



2009; Fejes et al, 2005; Aitken et al, 2005; Kumar, 2012). 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 (Aitken et al, 2004; Agarwal et al, 2007; Eroglu et al., 2006). 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 (Dasdag et al, 1999; Yan et al, 2007; Otitolaju et al, 2010; Salama et al, 2008; Behari et al, 2006; Kumar et al, 2012). 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*. 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. 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 one microwatt per centimeter squared ( $\mu\text{W}/\text{cm}^2$ ).

### **EVIDENCE THAT CHILDREN ARE MORE VULNERABLE**

There is good evidence to suggest that many toxic exposures to the fetus and very young child have especially detrimental consequences depending on when they occur during critical phases of growth and development (time windows of critical development), where such exposures may lay the seeds of health harm that develops even decades later. Existing FCC and ICNIRP public safety limits seem to be not sufficiently protective of public health, in particular for the young (embryo, fetus, neonate, very young child).

The Presidential Cancer Panel (2010) found that children *'are at special risk due to their smaller body mass and rapid physical development, both of which magnify their vulnerability to known carcinogens, including radiation.'*

The American Academy of Pediatrics, in a letter to Congressman Dennis Kucinich dated 12 December 2012 states *"Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults. It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes."*

### **FETAL AND NEONATAL EFFECTS OF EMF**

Fetal (*in-utero*) and early childhood exposures to cell phone radiation and wireless technologies in general may be a risk factor for hyperactivity, learning disorders and behavioral problems in school.

**Fetal Development Studies:** Effects on the developing fetus from *in-utero* exposure to cell phone radiation have been observed in both human and animal studies since 2006. Divan et al (2008) found that children born of mothers who used cell phones during pregnancy develop more behavioral problems by the time they have reached school age than children whose mothers did not use cell phones during pregnancy. Children whose mothers used cell phones during pregnancy had 25% more emotional problems, 35% more hyperactivity, 49% more conduct problems and 34% more peer problems (Divan et al., 2008).

Common sense measures to limit both ELF-EMF and RF EMF in these populations is needed, especially with respect to avoidable exposures like incubators that can be modified; and where education of the pregnant mother with respect to laptop computers, mobile phones and other sources of ELF-EMF and RF EMF are easily instituted.

Sources of fetal and neonatal exposures of concern include cell phone radiation (both paternal use of wireless devices worn on the body and maternal use of wireless phones during pregnancy). Exposure to whole-body RFR from base stations and WI-FI, use of wireless laptops, use of incubators for newborns with excessively high ELF-EMF levels resulting in altered heart rate variability and reduced melatonin levels in newborns, fetal exposures to MRI of the pregnant mother, and greater susceptibility to leukemia and asthma in the child where there have been maternal exposures to ELF-EMF.



A precautionary approach may provide the frame for decision-making where remediation actions have to be realized to prevent high exposures of children and pregnant woman.  
(Bellieni and Pinto, 2012 – Section 19)

### **EMF/RFR AS A PLAUSIBLE BIOLOGICAL MECHANISM FOR AUTISM (ASD)**

- Children with existing neurological problems that include cognitive, learning, attention, memory, or behavioral problems should as much as possible be provided with wired (not wireless) learning, living and sleeping environments,
- Special education classrooms should observe 'no wireless' conditions to reduce avoidable stressors that may impede social, academic and behavioral progress.
- All children should reasonably be protected from the physiological stressor of significantly elevated EMF/RFR (wireless in classrooms, or home environments).
- School districts that are now considering all-wireless learning environments should be strongly cautioned that wired environments are likely to provide better learning and teaching environments, and prevent possible adverse health consequences for both students and faculty in the long-term.
- Monitoring of the impacts of wireless technology in learning and care environments should be performed with sophisticated measurement and data analysis techniques that are cognizant of the non-linear impacts of EMF/RFR and of data techniques most appropriate for discerning these impacts.
- There is sufficient scientific evidence to warrant the selection of wired internet, wired classrooms and wired learning devices, rather than making an expensive and potentially health-harming commitment to wireless devices that may have to be substituted out later, and
- Wired classrooms should reasonably be provided to all students who opt-out of wireless environments. (Herbert and Sage, 2012 – Section 20)

Many disrupted physiological processes and impaired behaviors in people with ASDs closely resemble those related to biological and health effects of EMF/RFR exposure. Biomarkers and indicators of disease and their clinical symptoms have striking similarities. Broadly speaking, these types of phenomena can fall into one or more of several classes: a) alteration of genes or gene expression, b) induction of change in brain or organismic development, c) alteration of phenomena modulating systemic and brain function on an ongoing basis throughout the life course (which can include systemic pathophysiology as well as brain-based changes), and d) evidence of functional alteration in domains such as behavior, social interaction and attention known to be challenged in ASD. Several thousand scientific studies over four decades point to serious biological effects and health harm from EMF and RFR. These studies report genotoxicity, single- and double-strand DNA damage, chromatin condensation, loss of DNA repair capacity in human stem cells, reduction in free-radical scavengers (particularly melatonin), abnormal gene transcription, neurotoxicity, carcinogenicity, damage to sperm morphology and function, effects on behavior, and effects on brain development in the fetus of human mothers that use cell phones during pregnancy. Cell phone exposure has been linked to altered fetal brain development and ADHD-like behavior in the offspring of pregnant mice. Reducing life-long health risks begins in the earliest stages of embryonic and fetal development, is accelerated for the infant and very young child compared to adults, and is not complete in young people (as far as brain and nervous system maturation) until the early 20's. Windows of critical development mean that risk factors once laid down in the cells, or in epigenetic



changes in the genome may have grave and life-long consequences for health or illness for every individual.

All relevant environmental conditions, including EMF and RFR, which can degrade the human genome, and impair normal health and development of species including homo sapiens, should be given weight in defining and implementing prudent, precautionary actions to protect public health.

Allostatic load in autism and autistic decompensation – we may be at a tipping point that can be pushed back by removing unnecessary stressors like EMF/RFR and building resilience.

The consequence of ignoring clear evidence of large-scale health risks to global populations, when the risk factors are largely avoidable or preventable is too high a risk to take. With the epidemic of autism (ASD) putting the welfare of children, and their families in peril at a rate of one family in 88, the rate still increasing annually, we cannot afford to ignore this body of evidence. The public needs to know that these risks exist, that transition to wireless should not be presumed safe, and that it is very much worth the effort to minimize exposures that still provide the benefits of technology in learning, but without the threat of health risk and development impairments to learning and behavior in the classroom.

(Herbert and Sage, 2010 – Section 20)

### **THE BLOOD-BRAIN BARRIER IS AT RISK**

*The BBB is a protective barrier that prevents the flow of toxins into sensitive brain tissue. Increased permeability of the BBB caused by cell phone RFR may result in neuronal damage. Many research studies show that very low intensity exposures to RFR can affect the blood-brain barrier (BBB) (mostly animal studies). Summing up the research, it is more probable than unlikely that non-thermal EMF from cell phones and base stations do have effects upon biology. A single 2-hr exposure to cell phone radiation can result in increased leakage of the BBB, and 50 days after exposure, neuronal damage can be seen, and at the later time point also albumin leakage is demonstrated. The levels of RFR needed to affect the BBB have been shown to be as low as 0.001 W/kg, or less than holding a mobile phone at arm's length. The US FCC standard is 1.6 W/kg; the ICNIRP standard is 2 W/kg of energy (SAR) into brain tissue from cell/cordless phone use. Thus, BBB effects occur at about 1000 times lower RFR exposure levels than the US and ICNIRP limits allow. (Salford, 2012 – Section 10)*

If the blood-brain barrier is vulnerable to serious and on-going damage from wireless exposures, then we should perhaps also be looking at the blood-ocular barrier (that protects the eyes), the blood-placenta barrier (that protects the developing fetus) and the blood-gut barrier (that protects proper digestion and nutrition), and the blood-testes barrier (that protects developing sperm) to see if they too can be damaged by RFR.

### **EPIDEMIOLOGICAL STUDIES CONSISTENTLY SHOW ELEVATIONS IN RISK OF BRAIN CANCERS**

Brain Tumors: There is a consistent pattern of increased risk of glioma and acoustic neuroma associated with use of mobile phones and cordless phones.

*“Based on epidemiological studies there is a consistent pattern of increased risk for glioma and acoustic neuroma associated with use of mobile phones and cordless phones. The evidence comes mainly from two study centres, the Hardell group in Sweden and the Interphone Study Group. No consistent pattern of an increased risk is seen for meningioma. A systematic bias in the studies that explains the results would also have been the case for meningioma. The different risk pattern for tumor type strengthens the findings regarding glioma and acoustic neuroma. Meta-analyses of the Hardell group and Interphone studies show an increased risk for glioma and acoustic neuroma. Supportive evidence comes also from anatomical localisation of the tumor to the most exposed area of the brain, cumulative exposure in hours and latency time that all add to the biological relevance of an increased risk. In addition risk calculations based on estimated absorbed dose give strength to the findings. (Hardell, 2012 – Section 11)*

*“There is reasonable basis to conclude that RF-EMFs are bioactive and have a potential to cause health impacts. There is a consistent pattern of increased risk for glioma and acoustic neuroma associated with use of wireless phones (mobile phones and cordless phones) mainly based on results from case-control studies from the Hardell group and Interphone Final Study results. Epidemiological evidence gives that RF-EMF should be classified as a human carcinogen.*



*Based on our own research and review of other evidence the existing FCC/IEE and ICNIRP public safety limits and reference levels are not adequate to protect public health. New public health standards and limits are needed.*

#### **EVIDENCE FOR GENETIC EFFECTS**

Eighty six (86) new papers on genotoxic effects of RFR published between 2007 and mid-2012 are profiled. Of these, 54 (63%) showed effects and 32 (37%) showed no effects.

Forty three (43) new ELF-EMF papers and two static magnetic field papers that report on genotoxic effects of ELF-EMF published between 2007 and mid-2012 are profiled. Of these, 35 (81%) show effects and 8 (19%) show no effect.

#### **EVIDENCE FOR NEUROLOGICAL EFFECTS**

One hundred fifty five (155) new papers that report on neurological effects of RFR published between 2007 and mid-2012 are profiled. Of these, 98 (63%) showed effects and 57 (37%) showed no effects.

Sixty nine (69) new ELF-EMF papers (including two static field papers) that report on genotoxic effects of ELF-EMF published between 2007 and mid-2012 are profiled. Of these, 64 (93%) show effects and 5 (7%) show no effect.

#### **EVIDENCE FOR CHILDHOOD CANCERS (LEUKEMIA)**

With overall 42 epidemiological studies published to date power frequency EMFs are among the most comprehensively studied environmental factors. Except ionizing radiation no other environmental factor has been as firmly established to increase the risk of childhood leukemia.

Sufficient evidence from epidemiological studies of an increased risk from exposure to EMF (power frequency magnetic fields) that cannot be attributed to chance, bias or confounding. Therefore, according to the rules of IARC such exposures can be classified as a **Group 1 carcinogen (Known Carcinogen)**. There is no other risk factor identified so far for which such unlikely conditions have been put forward to postpone or deny the necessity to take steps towards exposure reduction. As one step in the direction of precaution, measures should be implemented to guarantee that exposure due to transmission and distribution lines is below an average of about 1 mG. This value is arbitrary at present and only supported by the fact that in many studies this level has been chosen as a reference.

Base-station level RFR at levels ranging from less than 0.001 uW/cm<sup>2</sup> to 0.05 uW/cm<sup>2</sup>. In 5 new studies since 2007, researchers report headaches, concentration difficulties and behavioral problems in children and adolescents; and sleep disturbances, headaches and concentration problems in adults.

#### **MELATONIN, BREAST CANCER AND ALZHEIMER'S DISEASE**

##### **MELATONIN AND BREAST CANCER**

Conclusion: Eleven (11) of the 13 published epidemiologic residential and occupational studies are considered to provide (positive) evidence that high ELF MF exposure can result in decreased melatonin production. The two negative studies had important deficiencies that may certainly have biased the results. There is sufficient evidence to conclude that long-term relatively high ELF MF exposure can result in a decrease in melatonin production. It has not been determined to what extent personal characteristics, e.g., medications, interact with ELF MF exposure in decreasing melatonin production

Conclusion: New research indicates that ELF MF exposure, in vitro, can significantly decrease melatonin activity through effects on MT1, an important melatonin receptor.

##### **ALZHEIMER'S DISEASE**

There is strong epidemiologic evidence that exposure to ELF MF is a risk factor for AD. There are now twelve (12) studies of ELF MF exposure and AD or dementia which . Nine (9) of these studies are considered positive and three (3) are considered negative. The three negative studies have serious deficiencies in ELF MF exposure classification that results in subjects with rather low exposure being

considered as having significant exposure. There are insufficient studies to formulate an opinion as to whether radiofrequency MF exposure is a risk or protective factor for AD.

There is now evidence that (i) high levels of peripheral amyloid beta are a risk factor for AD and (ii) medium to high ELF MF exposure can increase peripheral amyloid beta. High brain levels of amyloid beta are also a risk factor for AD and medium to high ELF MF exposure to brain cells likely also increases these cells' production of amyloid beta.

There is considerable in vitro and animal evidence that melatonin protects against AD. Therefore it is certainly possible that low levels of melatonin production are associated with an increase in the risk of AD.

(Davanipour and Sobel, 2012 – Section 13)

### **STRESS PROTEINS AND DNA AS A FRACTAL ANTENNA FOR RFR**

DNA acts as a 'fractal antenna' for EMF and RFR. The coiled-coil structure of DNA in the nucleus makes the molecule react like a fractal antenna to a wide range of frequencies. The structure makes DNA particularly vulnerable to EMF damage.

The mechanism involves direct interaction of EMF with the DNA molecule (claims that there are no known mechanisms of interaction are patently false)

Many EMF frequencies in the environment can and do cause DNA changes.

The EMF-activated cellular stress response is an effective protective mechanism for cells exposed to a wide range of EMF frequencies.

EMF stimulates stress proteins (indicating an assault on the cell).

EMF efficiently harms cells at a billion times lower levels than conventional heating.

Safety standards based on heating are irrelevant to protect against EMF-levels of exposure. There is an urgent need to revise EMF exposure standards. Research has shown thresholds are very low (safety standards must be reduced to limit biological responses). Biologically-based EMF safety standards could be developed from the research on the stress response.

### **EVIDENCE FOR DISRUPTION OF THE MODULATING SIGNAL HUMAN STEM CELL DNA DOES NOT ADAPT OR REPAIR**

Human stem cells do not adapt to chronic exposures to non-thermal microwave (cannot repair damaged DNA), and damage to DNA in genes in other cells generally do not repair as efficiently.

Non-thermal effects of microwaves depend on variety of biological and physical parameters that should be taken into account in setting the safety standards. Emerging evidence suggests that the SAR concept, which has been widely adopted for safety standards, is not useful alone for the evaluation of health risks from non-thermal microwave of mobile communication. Other parameters of exposure, such as frequency, modulation, duration, and dose should be taken into account. Lower intensities are not always less harmful; they may be more harmful. Intensity windows exist, where bioeffects are much more powerful.

A linear, dose-response relationship test is probably invalid for testing of RFR and EMF (as is done in chemicals testing for toxicity).

Resonant frequencies may result in biological effects at very low intensities comparable to base station (cell tower) and other microwave sources used in mobile communications.

These exposures can cause health risk. The current safety standards are insufficient to protect from non-thermal microwave effects.

The data about the effects of microwave at super-low intensities and significant role of duration of exposure in these effects along with the data showing that adverse effects of non-thermal microwave from gsm/UMTS mobile phones depend on carrier frequency and type of the microwave signal suggest that microwave from base-stations/masts, wireless routers, WI-FI and other wireless devices and exposures in common use today can also produce adverse effects at prolonged durations of exposure. Most of the real signals that are in use in mobile communication have not been tested so far. Very little research has been done with real signals and for durations and intermittences of exposure that are relevant to chronic exposures from mobile communication. In some studies, so-called "mobile



communication-like" signals were investigated that in fact were **different** from the real exposures in such important aspects as intensity, carrier frequency, modulation, polarization, duration and intermittence. New standards should be developed based on knowledge of mechanisms of non-thermal effects. Importantly, because the signals of mobile communication are completely replaced by other signals faster than once per 10 years, duration comparable with latent period, epidemiologic studies cannot provide basement for cancer risk assessment from upcoming new signals. In many cases, because of ELF modulation and additional ELF fields created by the microwave sources, for example by mobile phones, it is difficult to distinguish the effects of exposures to ELF and microwave. Therefore, these combined exposures and their possible cancer risks should be considered in combination.

As far as different types of microwave signals (carrier frequency, modulation, polarization, far and near field, intermittence, coherence, etc.) may produce different effects, cancer risks should ideally be estimated for each microwave signal separately.

The Precautionary Principle should be implemented while new standards are in progress.

It should be anticipated that some part of the human population, such as children, pregnant women and groups of hypersensitive persons could be especially sensitive to the non-thermal microwave exposures.

#### **N. EFFECTS OF WEAK-FIELD INTERACTIONS ON NON-LINEAR BIOLOGICAL OSCILLATORS AND SYNCHRONIZED NEURAL ACTIVITY**

A unifying hypothesis for a plausible biological mechanism to account for very weak field EMF bioeffects other than cancer may lie with weak field interactions of pulsed RFR and ELF-modulated RFR as disrupters of synchronized neural activity. Electrical rhythms in our brains can be influenced by external signals. This is consistent with established weak field effects on coupled biological oscillators in living tissues. Biological systems of the heart, brain and gut are dependent on the cooperative actions of cells that function according to principles of non-linear, coupled biological oscillations for their synchrony, and are dependent on exquisitely timed cues from the environment at vanishingly small levels (Buzsaki, 2006; Strogatz, 2003). The key to synchronization is the joint actions of cells that co-operate electrically – linking populations of biological oscillators that couple together in large arrays and synchronize spontaneously. Synchronous biological oscillations in cells (pacemaker cells) can be disrupted by artificial, exogenous environmental signals, resulting in desynchronization of neural activity that regulates critical functions (including metabolism) in the brain, gut and heart and circadian rhythms governing sleep and hormone cycles (Strogatz, 1987). The brain contains a population of oscillators with distributed natural frequencies, which pull one another into synchrony (the circadian pacemaker cells). Strogatz has addressed the unifying mathematics of biological cycles and external factors disrupt these cycles (Strogatz, 2001, 2003). *"Rhythms can be altered by a wide variety of agents and that these perturbations must seriously alter brain performance"* (Buzsaki, 2006).

*"Organisms are biochemically dynamic. They are continuously subjected to time-varying conditions in the form of both extrinsic driving from the environment and intrinsic rhythms generated by specialized cellular clocks within the organism itself. Relevant examples of the latter are the cardiac pacemaker located at the sinoatrial node in mammalian hearts (1) and the circadian clock residing at the suprachiasmatic nuclei in mammalian brains (2). These rhythm generators are composed of thousands of clock cells that are intrinsically diverse but nevertheless manage to function in a coherent oscillatory state. This is the case, for instance, of the circadian oscillations exhibited by the suprachiasmatic nuclei, the period of which is known to be determined by the mean period of the individual neurons making up the circadian clock (3–7). The mechanisms by which this collective behavior arises remain to be understood."* (Strogatz, 2001; Strogatz, 2003)

Synchronous biological oscillations in cells (pacemaker cells) can be disrupted by artificial, exogenous environmental signals, resulting in desynchronization of neural activity that regulates critical functions (including metabolism) in the brain, gut and heart and circadian rhythms governing sleep and hormone cycles. The brain contains a population of oscillators with distributed natural frequencies, which pull one another into synchrony (the circadian pacemaker cells). Strogatz has addressed the unifying mathematics of biological cycles and external factors disrupt these cycles.



## **EMF AND RFR MAKE CHEMICAL TOXINS MORE HARMFUL**

EMF acts on the body like other environmental toxicants do (heavy metals, organic chemicals and pesticides). Both toxic chemicals and EMF may generate free radicals, produce stress proteins and cause indirect damage to DNA. Where there is combined exposure the damages may add or even synergistically interact, and result in worse damage to genes.

## **EMF IS SUCCESSFULLY USED IN HEALING AND DISEASE TREATMENTS**

*"The potential application of the up-regulation of the HSP70 gene by both ELF-EMF and nanosecond PEMF in clinical practice would include trauma, surgery, peripheral nerve damage, orthopedic fracture, and vascular graft support, among others. Regardless of pulse design, EMF technology has been shown to be effective in bone healing [5], wound repair [11] and neural regeneration [31,36,48,49,51,63,64,65,66]. In terms of clinical application, EMF-induction of elevated levels of hsp70 protein also confers protection against hypoxia [61] and aid myocardial function and survival [20,22]. Given these results, we are particularly interested in the translational significance of effect vs. efficacy which is not usually reported by designers or investigators of EMF devices. More precise description of EM pulse and sine wave parameters, including the specific EM output sector, will provide consistency and "scientific basis" in reporting findings." "The degree of electromagnetic field-effects on biological systems is known to be dependent on a number of criteria in the waveform pattern of the exposure system used; these include frequency, duration, wave shape, and relative orientation of the fields [6,29,32,33,39,40]. In some cases pulsed fields have demonstrated increased efficacy over static designs [19,21] in both medical and experimental settings." (Madkan et al, 2009)*

## **ELF-EMF AND RFR ARE CLASSIFIED AS POSSIBLE CANCER-CAUSING AGENTS – WHY ARE GOVERNMENTS NOT ACTING?**

The World Health Organization International Agency for Research on Cancer has classified wireless radiofrequency as a Possible Human Carcinogen (May, 2011)\*. The designation applies to low-intensity RFR in general, covering all RFR-emitting devices and exposure sources (cell and cordless phones, WI-FI, wireless laptops, wireless hotspots, electronic baby monitors, wireless classroom access points, wireless antenna facilities, etc). The IARC Panel could have chosen to classify RFR as a Group 4 – Not A Carcinogen if the evidence was clear that RFR is not a cancer-causing agent. It could also have found a Group 3 designation was a good interim choice (Insufficient Evidence). IARC did neither.

## **NEW SAFETY LIMITS MUST BE ESTABLISHED – HEALTH AGENCIES SHOULD ACT NOW**

Existing public safety limits (FCC and ICNIRP public safety limits) do not sufficiently protect public health against chronic exposure from very low-intensity exposures. If no mid-course corrections are made to existing and outdated safety limits, such delay will magnify the public health impacts with even more applications of wireless-enabled technologies exposing even greater populations around the world in daily life.

## **SCIENTIFIC BENCHMARKS FOR HARM PLUS SAFETY MARGIN = NEW SAFETY LIMITS THAT ARE VALID**

Health agencies and regulatory agencies that set public safety standards for ELF-EMF and RFR should act now to adopt new, biologically-relevant safety limits that key to the lowest scientific benchmarks for harm coming from the recent studies, plus a lower safety margin. Existing public safety limits are too high by several orders of magnitude, if prevention of bioeffects and minimization or elimination of resulting adverse human health effects. Most safety standards are a thousand times or more too high to protect healthy populations, and even less effective in protecting sensitive subpopulations.

## **SENSITIVE POPULATIONS MUST BE PROTECTED**

Safety standards for sensitive populations will more likely need to be set at lower levels than for healthy adult populations. Sensitive populations include the developing fetus, the infant, children, the elderly, those with pre-existing chronic diseases, and those with developed electrical sensitivity (EHS).



### **PROTECTING NEW LIFE – INFANTS AND CHILDREN**

Strong precautionary action and clear public health warnings are warranted immediately to help prevent a global epidemic of brain tumors resulting from the use of wireless devices (mobile phones and cordless phones). Common sense measures to limit both ELF-EMF and RFR in the fetus and newborn infant (sensitive populations) are needed, especially with respect to avoidable exposures like baby monitors in the crib and baby isolettes (incubators) in hospitals that can be modified; and where education of the pregnant mother with respect to laptop computers, mobile phones and other sources of ELF-EMF and RFR are easily instituted. Wireless laptops and other wireless devices should be strongly discouraged in schools for children of all ages.

### **STANDARD OF EVIDENCE FOR JUDGING THE SCIENCE**

The standard of evidence for judging the scientific evidence should be based on good public health principles rather than demanding scientific certainty before actions are taken.

### **WIRELESS WARNINGS FOR ALL**

The continued rollout of wireless technologies and devices puts global public health at risk from unrestricted wireless commerce unless new, and far lower exposure limits and strong precautionary warnings for their use are implemented.

### **EMF AND RFR ARE PREVENTABLE TOXIC EXPOSURES**

We have the knowledge and means to save global populations from multi-generational adverse health consequences by reducing both ELF and RFR exposures. Proactive and immediate measures to reduce unnecessary EMF exposures will lower disease burden and rates of premature death.

### **DEFINING A NEW 'EFFECT LEVEL' FOR RFR**

On a precautionary public health basis, a reduction from the BioInitiative 2007 recommendation of 0.1  $\mu\text{W}/\text{cm}^2$  (or one-tenth of a microwatt per square centimeter) for cumulative outdoor RFR down to something three orders of magnitude lower (in the low nanowatt per square centimeter range) is justified. A scientific benchmark of 0.003  $\mu\text{W}/\text{cm}^2$  or three nanowatts per centimeter squared for 'lowest observed effect level' for RFR is based on mobile phone base station-level studies. Applying a ten-fold reduction to compensate for the lack of long-term exposure (to provide a safety buffer for chronic exposure, if needed) or for children as a sensitive subpopulation yields a 300 to 600 picowatts per square centimeter precautionary action level. This equates to a 0.3 nanowatts to 0.6 nanowatts per square centimeter as a reasonable, precautionary action level for chronic exposure to pulsed RFR. These levels may need to change in the future, as new and better studies are completed. We leave room for future studies that may lower or raise today's observed 'effects levels' and should be prepared to accept new information as a guide for new precautionary actions.





# Parents For Safe Technology

(<http://www.parentsforsafetechnology.org/electromagnetic-fields-and-cows.html>)

Research on cows shows that these large mammals are significantly effected by EMF radiation. We think this should be a wake up call to humans who are mammals too!

## Electromagnetic Fields, Wireless and Cows

[Cows: A big model for EMF research, somewhere between Vet-Journals and "Nature"](#)

Maren Fedrowitz, The Bioelectromagnetics Society, Sep 5, 2014, Department of Pharmacology, Toxicology, and Pharmacy, University of Veterinary Medicine, Hannover, Germany

- Effects of electromagnetic fields (EMF) on cows have been frequently discussed in public media as well as in specialist journals and meetings with agricultural, veterinary or dairy backgrounds. Indeed, in view of the available literature, it does seem that cows show EMF susceptibilities and respond to environmental exposures of a broad range of frequencies and properties:
- Cows are sensitive to the Earth's magnetic field. Bovine magnetoreception can be influenced by external EMF, e.g. powerlines.
- Several physiological alterations in dairy cows exposed to extremely low frequency (ELF) EMF were reported without major indications for adverse health effects. Notably, the observed effects seem to be dependent on the magnetic field component or on combined electric and magnetic fields rather than on electric field exposure alone.
- Cows are sensitive to earth currents (stray voltage) associated with transients in particular harmonics. Milk production, health, and behavior seem to be negatively affected.
- Bovine responses to radiofrequency (RF) exposure include avoidance behavior, reduced ruminating time, and alterations in oxidative stress. These findings indicate possible adverse health effects. However, most of the studies have critical points (one-herd-case report, logistic problems in study design, lack of appropriate exposure assessment) that confirmation of the observed RF effects is clearly needed, though studies in such big animals are time-, place-, and money-consuming, and exposure assessment and dosimetry are challenging issues.

The researchers concluded that ants can be used as bio-indicators to reveal the biological effects of RF signals from some wireless devices. They also advised users to de-activate the Wi-Fi function of their PCs. (15)

## Bees

Bees also have an electrical sense. Bees are positively charged, and flowers are negatively charged. These charges help pollen stick to bees' hair while they pollenate. In 2012, biologist Dominic Clarke and his colleagues showed that bees use their electrical sense to determine whether or not a flower has recently been visited by another bee—and is therefore worth visiting. (16,17)

In *Bees, Birds and Mankind: Effects of Wireless Communication Technologies* (Kentum, 2009), German scientist Ulrich Warnke states, "Bees and other insects, just as birds, use the Earth's magnetic field and high frequency electromagnetic energy such as light. They accomplish orientation and navigation by means of free radicals as well as a simultaneously reacting magnetite conglomerate. Technically produced electromagnetic oscillations in the MHz range and magnetic impulses in the low frequency range persistently disturb the natural orientation and navigation mechanisms created by evolution."

In his book, Warnke quotes Ferdinand Ruzicka, a scientist and beekeeper who reported, in 2003, after several transmitters (cellular antennas) were erected in the immediate vicinity of his hives: "I observed a pronounced restlessness in my bee colonies (initially about forty) and a greatly increased urge to swarm. As a frame-hive beekeeper, I use a so-called high floor. The bees did not build their combs in the manner prescribed by the frames, but in random fashion. In the summer, bee colonies collapsed without obvious cause. In the winter, I observed that the bees went foraging despite snow and temperatures below zero, and they died of cold next to the hive. Colonies that exhibited this behavior collapsed, even though they were strong, healthy colonies with active queens before winter. They were provided with adequate additional food and the available pollen was more than adequate in autumn."

Ruzicka then organized a survey of beekeepers through the magazine *Der Bienen Vater*. All twenty of the beekeepers who replied to his questionnaire had a transmitter within 300 meters of their beehives. Compared to the bees' behavior before and after the transmitters were in operation, 37.5% observed increased aggression from their bees.

25% found that their bees had a greater tendency to swarm.

65% reported that their colonies were inexplicably collapsing since the transmitters became operational.

Warnke says that monocultures, pesticides, the Varroa mite, migratory beekeeping, dressed seed, severe winters, and genetically modified seeds could also explain the bee colonies' collapse. However, none of these convincingly explains "the fairly sudden



and country-spanning appearance two to three years ago of the dying bees phenomenon. Should the bees simply be too weak or ill, they should also die in or near the hive. But no ill bees were found in research into this phenomenon.”

In May, 2009, The U.S. Fish and Wildlife Service urged Congress to investigate the potential relationship between wireless devices and bee colony collapse. (18)

## **Frogs**

In 2010, Spanish biologist Alfonso Balmori published his study of a common frog habitat 140 meters from a cellular antenna. The experiment lasted two months, from the egg phase until an advanced phase of tadpole. Balmori placed some of the frogs inside a Faraday cage. These shielded frogs had a mortality of 4.2%. The unshielded frogs – exposed to the antenna’s RF fields—had a mortality of 90%. Balmori concluded that “this research may have huge implications for the natural world, which is now exposed to high microwave radiation levels from a multitude of phone masts.” (19)

## **Bird collisions with telecom equipment**

Albert Manville, PhD, wildlife biologist with the Division of Migratory Bird Management, U.S. Fish and Wildlife Service (USFWS), estimates that up to 6.8 million birds die per year in collisions with communications antennas or their guy-support wires in North America. The impacts of cellular antenna radiation on migratory birds in North America, especially those nesting close to these structures, remain suspect and unknown. In January 2012, Dr. Manville wrote: *Recent studies from Europe raise troubling concerns about the effects of radiation from cellular communication antennas, especially on resident, breeding migratory birds. These apparent effects include feather deformities, weight loss, weakness, reduced survivorship and death, especially to those birds and their offspring nesting adjacent to cellular antennas. Where Before-After, Control-Impact (BACI) studies were performed during some of the European research, no effects to resident birds were detected prior to construction and operation of cellular communication antennas. Some laboratory studies in the U.S. have documented lethal effects of extremely low levels of radiation to chicken embryos in the frequencies of cellular telephones, (20) but research to better address cause and effect to wild birds in North America has yet to be conducted. To date, only anecdotal reports from instances in North America have been brought to the attention of authorities at the USFWS. If we are to better understand the cumulative effects of human infrastructure on migratory birds—including communication technologies, research needs to be conducted to specifically address how radiation is affecting migratory birds and what resultant lethal and injurious effects are occurring. The explosive growth of hand-held technologies raises further concerns since potential impacts may grow. The unpermitted killing or injury of a migratory bird, is called a “take” under the Migratory Bird Treaty Act (MBTA). The USFWS does not permit the ‘incidental or accidental take’ of any of the 1007 migratory bird species protected under MBTA. Therefore, studies need to be undertaken to determine how much ‘take’ is occurring as a result of radiation, and what steps can be undertaken to “avoid or minimize” future “take.” The USFWS continues to suggest to the FCC the need for these North American*



*studies based alone on cumulative effects that must be addressed under National Environmental Policy Act review. The studies need to better tease out how and at what level “takes” are occurring, then determine what conservation measures can be adopted to “avoid or minimize” future “take.” Because of the controversial nature of this issue, any studies and outcomes need to be seamless and fully transparent.*

### **The white stork**

During the Springs of 2002, 2003 and 2004, biologist Alfonso Balmori monitored the reproduction of the white stork, a vulnerable bird species that usually lives in urban areas. White stork couples build their nests in pinnacles and other very high places that are now exposed to man-made microwaves. Balmori studied white stork nests within 200 meters of antennas and nests located more than 300 meters from antennas. He found that 40% of the nests within 200 meters of antennas had no chicks, while only 3.3% of nests further than 300 meters of antennas had no chicks. Also, near antennas, white stork couples frequently fought for sticks, their sticks fell to the ground while they tried to build nests, the nests did not get built and hatched white stork chicks frequently died. (21)

Common citizens have also observed changes in birds when technologies that emit EMR are deployed. After transmitting water meters were installed in Renton, Washington in December, 2012, a retired civil engineer who had spent thirty dollars per month on birdseed for years noticed that the feeders in his yard no longer emptied. His neighbors also noticed that immediately after the transmitting water meters were installed, the birds that had frequented their yard (beside a greenbelt) disappeared. (22)

### **Birds, bees and magnetically-sensitive cryptochromes**

*Why would RF signals disturb birds and bees? Here’s an answer from biologist Andrew Goldsworthy, PhD: To navigate and also to control their immune systems, birds and bees use magnetically-sensitive substances called cryptochromes. These are pigments found in virtually all animals, plants and many bacteria. Cryptochromes absorb blue-green and ultra-violet light and use this energy to drive photochemical reactions where light energy is converted to chemical energy. Cryptochromes measure light to control and reset animals’ and plants’ biological clocks. Some animals also use cryptochromes to sense the direction of the Earth’s magnetic field.*

*Unfortunately, cryptochromes are badly impaired by man-made oscillating fields that are orders of magnitude weaker than the Earth’s steady magnetic field. Such impairment can disrupt insects’ and animals’ solar and magnetic navigational abilities. It can account for colony collapse disorder in bees, the loss of some migratory birds and butterflies, and immune system weakening in many more organisms.*

*An array of cryptochrome molecules oriented in different directions can be found in the compound eye of an insect, or in the retina of a vertebrate’s eye. This cryptochrome found in the eyes is quite distinct from the regular visual pigments (rhodopsins) that are used in normal vision. However, the combination of these pigments gives the animal the potential to “see” the direction of the magnetic field, possibly as an extra color superimposed on its normal field of vision.*



Robins can navigate in the Earth's magnetic field if they receive light from wavelengths absorbed by cryptochrome. (23) However, exposure to man-made frequencies between 0.1 and 10MHz at field strengths as little as 0.085 mT (about 500 times weaker than the Earth's magnetic field) made the birds completely unable to respond to the Earth's field. Frequencies used by mobile devices, including cell phones, DECT cordless landline phones and Wi-Fi, can blot out "magnetic vision." Even lower field strengths are likely to disturb magnetic navigation, since radiation that is too weak to blot out magnetic vision totally may still be strong enough to distort a bird's perception of the Earth's field, causing the bird or insect to fly in the wrong direction.

The sheer number of wireless devices gives birds continuously conflicting navigational data – as if they're constantly bombarded by flashing disco lights. We should not be surprised that birds would leave such areas. Likewise, scientists who put DECT cordless phone base stations next to their beehives found that their bees behaved abnormally and were less likely to return to the hive. (24) (Beekeepers are thereby well advised not to carry their mobile phones when visiting their hives.)

Birds, bees and many other animals can also navigate by the sun's position. To do this, they must have an internal clock that adjusts to the sun's changing position throughout the day. Cryptochrome makes this clock sensitive to magnetic fields. A 300 mT steady field can alter the clock's speed or even stop it altogether. (25) Given that sensing light and magnetic fields by cryptochrome uses the same basic mechanics as the internal clock, it's likely that weak alternating fields would also disrupt a clock's normal functions. As a consequence, weak, man-made electromagnetic fields would render animals unable to adjust accurately to the sun's changing position. This leaves the animal unable to use either magnetic or solar navigation. If there were no landmarks to guide it, the animal would be completely lost. This could explain colony collapse disorder, when bees do not return to their hives.

Circadian (daily) metabolic rhythms, which occur in virtually all higher organisms, keep us in sync with the Earth's twenty-four hour rotation on its axis. Circadian rhythms are also driven by cryptochrome-containing internal clocks. They enable the organism to anticipate the coming of dawn and dusk, and they modify its metabolism to be ready for the new conditions. Circadian rhythms control the production of melatonin (a sleep hormone); at night, they divert metabolic resources to repair and immune system strengthening.

Losing or even weakening of the circadian rhythm – due to a failure of the internal clock's exposure to man-made electromagnetic fields—would have serious consequences. In humans, this would result in tiredness during the day, poor sleep at night, and reduced production of melatonin. All of these effects have been reported in people exposed to continuous, weak, electromagnetic radiation from DECT phone base stations, Wi-Fi routers and cellular antennas.

Also, any weakening of the circadian rhythms' amplitudes means that processes controlled by them will never function at maximum power. The immune system may never be able to summon the massive power that is sometimes required to overcome pathogens or destroy developing cancer cells before they get out of control. In part, this could explain epidemiologists' findings that people living near cellular antennas have an



increased cancer risk. It could also explain bee colonies' continuing decreased health and ability to resist pathogens.

Bill Bruno, PhD biophysicist, retired from the Los Alamos National Lab: *Biology is very sophisticated in its ability to make use of electromagnetic fields. Cryptochromes are just one example. Despite centuries of discoveries in biology and advances in medicine, there is so much we don't know. For example, why do our brains, sinuses and other tissues have magnetic magnetite particles?*

*Our bones and collagen are piezoelectric: in an electric field, they expand and contract. What are the implications of that? And what about recent experiments that show that DNA is a semiconductor, and that melanin, including neuromelanin in the brain, is a conductor?*

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# **International Appeal**

## **Scientists call for Protection from Non-ionizing Electromagnetic Field Exposure**

**(Source: <https://www.emfscientist.org/index.php/emf-scientist-appeal>)**

We are scientists engaged in the study of biological and health effects of non-ionizing electromagnetic fields (EMF). Based upon peer-reviewed, published research, we have serious concerns regarding the ubiquitous and increasing exposure to EMF generated by electric and wireless devices. These include—but are not limited to—radiofrequency radiation (RFR) emitting devices, such as cellular and cordless phones and their base stations, Wi-Fi, broadcast antennas, smart meters, and baby monitors as well as electric devices and infra-structures used in the delivery of electricity that generate extremely-low frequency electromagnetic field (ELF EMF).

### **Scientific basis for our common concerns**

Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life.

These findings justify our appeal to the United Nations (UN) and, all member States in the world, to encourage the World Health Organization (WHO) to exert strong leadership in fostering the development of more protective EMF guidelines, encouraging precautionary measures, and educating the public about health risks, particularly risk to children and fetal development. By not taking action, the WHO is failing to fulfill its role as the preeminent international public health agency.

### **Inadequate non-ionizing EMF international guidelines**

The various agencies setting safety standards have failed to impose sufficient guidelines to protect the general public, particularly children who are more vulnerable to the effects of EMF. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) established in 1998 the “Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”. These guidelines are accepted by the WHO and numerous countries around the world. The WHO is calling for all nations to adopt the ICNIRP guidelines to encourage international harmonization of standards. In 2009, the ICNIRP released a statement saying that it was reaffirming its 1998 guidelines, as in their opinion, the scientific literature published since that time “has provided no evidence of any adverse effects below the basic restrictions and does not necessitate an immediate revision of its guidance on limiting exposure to high frequency electromagnetic fields”. ICNIRP continues to the present day to make these assertions, in spite of growing scientific evidence to the contrary. It is our opinion that, because the ICNIRP guidelines do not cover long-term exposure and low-intensity effects, they are insufficient to protect public health.

The WHO adopted the International Agency for Research on Cancer (IARC) classification of extremely low frequency electromagnetic field (ELF EMF) in 2002 and radiofrequency radiation



(RFR) in 2011 . This classification states that EMF is a possible human carcinogen (Group 2B). Despite both IARC findings, the WHO continues to maintain that there is insufficient evidence to justify lowering these quantitative exposure limits.

Since there is controversy about a rationale for setting standards to avoid adverse health effects, we recommend that the United Nations Environmental Programme (UNEP) convene and fund an independent multidisciplinary committee to explore the pros and cons of alternatives to current practices that could substantially lower human exposures to RF and ELF fields. The deliberations of this group should be conducted in a transparent and impartial way. Although it is essential that industry be involved and cooperate in this process, industry should not be allowed to bias its processes or conclusions. This group should provide their analysis to the UN and the WHO to guide precautionary action.

**Collectively we also request that:**

1. children and pregnant women be protected;
2. guidelines and regulatory standards be strengthened;
3. manufacturers be encouraged to develop safer technology;
4. utilities responsible for the generation, transmission, distribution, and monitoring of electricity maintain adequate power quality and ensure proper electrical wiring to minimize harmful ground current;
5. the public be fully informed about the potential health risks from electromagnetic energy and taught harm reduction strategies;
6. medical professionals be educated about the biological effects of electromagnetic energy and be provided training on treatment of patients with electromagnetic sensitivity;
7. governments fund training and research on electromagnetic fields and health that is independent of industry and mandate industry cooperation with researchers;
8. media disclose experts' financial relationships with industry when citing their opinions regarding health and safety aspects of EMF-emitting technologies; and
9. white-zones (radiation-free areas) be established.

1) <http://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf>

2) <http://www.icnirp.org/cms/upload/publications/ICNIRPStatementEMF.pdf>

3) <http://monographs.iarc.fr/ENG/Monographs/vol80/>

4) <http://monographs.iarc.fr/ENG/Monographs/vol102/>

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**All inquiries, including those from qualified scientists who request that their name be added to the Appeal, may be made by contacting Elizabeth Kelley, M.A., Director, EMFscientist.org, at [info@EMFscientist.org](mailto:info@EMFscientist.org).**

*Note: the signatories to this appeal have signed as individuals, giving their professional affiliations, but this does not necessarily mean that this represents the views of their employers or the professional organizations they are affiliated with.*







# 5G-appellen

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## Vetenskapsmän och läkare varnar för allvarliga hälsoeffekter av 5G-utbyggnad - begär moratorium

13 september 2017

*Vi, undertecknade mer än 180 vetenskapsmän och läkare från 36 nationer, rekommenderar moratorium för utbyggnaden av 5G för telekommunikation tills potentiella risker för människors hälsa och miljön har undersökts fullt ut av forskare utan kopplingar bindningar till industrin. 5G kommer att kraftigt öka exponeringen för radiofrekventa elektromagnetiska fält (RF-EMF) utöver den redan i dag befintliga från 2G, 3G, 4G, WiFi etc. RF-EMF har visat sig vara skadligt för både människor och miljö.*

(Obs: [Blå länkar](#) nedan är referenser.)

### 5G leder till massiv ökning av påtvingad exponering för strålning från trådlös teknik

5G-tekniken är endast effektiv över kort avstånd. Den tränger dåligt genom fast material. Många nya antenner kommer att krävas och fullskaligt genomförande kommer att resultera i antenner vart 10:e till 12:e hus i tätorter, vilket därmed **massivt ökar den påtvingade strålningen**.

Med "den allt mer omfattande användningen av trådlös teknik" kan ingen undvika att bli exponerad. Utöver det ökade antalet 5G-sändare, även inomhus, i butiker och på sjukhus, kommer enligt uppskattningar 10-20 miljarder anslutningar (till kylskåp, tvättmaskiner, övervaknings-kameror, självstyrande bilar och bus-sar etc.) att bli delar i "Sakernas Internet". Sammantaget kan detta väsentligt öka alla EU-medborgares sammanlagda långvariga exponering för RF-EMF-strålning.

### Skadliga effekter av RF-EMF-exponering redan bevisade

Över 220 forskare från mer än 40 länder har uttryckt att de är "allvarligt oroliga" över den allstädes närvarande och ökande exponeringen för EMF (elektromagnetiska fält) som alstras av elektriska och trådlösa enheter, redan före tillskottet av strålning från 5G. Forskarna hänvisar till det faktum att "många nya vetenskapliga publikationer har visat att EMF påverkar levande organismer vid nivåer långt under de flesta internationella och nationella gränsvärden". Effekterna innefattar ökad cancerrisk, cellulära stresseffekter, ökning av skadliga fria radikaler, genetiska skador, strukturella och funktionella förändringar i fortplantningssystemet, inlärnings- och minnesproblem, neurologiska störningar och negativa effekter på det allmänna välbefinnandet hos människor. Skadorna når långt utöver mänskligheten, eftersom det finns alltfler belägg för skadliga effekter på både växter och djur.

Sedan forskarnas varningar år 2015, har ytterligare forskning övertygande bekräftat allvarliga hälsorisker från RF-EMF från trådlös teknik. Världens största studie (25 miljoner US-dollar) från National Toxicology Program (NTP) visade statistiskt signifikant ökning av förekomsten av hjärn- och hjärtcancer hos djur exponerade för RF-EMF trots att strålningen var under ICNIRPs (International Commission on Non-Ionizing Radiation Protection) gränsvärden, vilka tillämpas av de flesta länder. Dessa resultat stöds av resultat från epidemiologiska studier på människor och risk för hjärttumörer av RF-EMF-strålning. Ett stort antal granskade vetenskapliga rapporter visar att strålning från EMF skadar människors hälsa.

Världshälsoorganisationen (WHO) cancerforskningsorganisation International Agency for Research on Cancer (IARC), konstaterade 2011 att EMF med frekvenserna 30 KHz – 300 GHz är "möjligen cancerframkallande" för människor (Grupp 2B). Emellertid bekräftar nya studier, som ovan nämnda NTP-studien och



# 5G-appellen

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flera epidemiologiska undersökningar inklusive de senaste undersökningarna om risk för hjärntumör av mobilanvändning, att RF-EMF-strålning är "cancerframkallande för människan".

EUROPA EM-EMF rapporten från 2016 konstaterar att det "finns starka belägg för att *långvarig exponering för vissa EMF är en riskfaktor för sjukdomar* t.ex. vissa cancerformer, Alzheimers sjukdom och manlig infertilitet ... Vanliga symtom på EHS (elöverkänslighet) innefattar huvudvärk, koncentrationssvårigheter, sömnstörningar, depression, brist på energi, trötthet och influensaliknande symtom."

En allt större del av den europeiska befolkningen är drabbad av sådan ohälsa som i vetenskaplig litteratur sedan många år har kopplats till exponering för EMF och strålning från trådlös teknik. I den Internationella Vetenskapliga Deklarationen om elöverkänslighet (EHS) och multipel kemisk känslighet (MCS), Bryssel 2015, förklaras att: "På basen av vår nuvarande vetenskapliga kunskap uppmanar vi därför alla nationella och internationella organ och institutioner ... att erkänna EHS och MCS som verkliga medicinska sjukdomar, som *kan leda till omfattande folkhälsoproblem* under många år framöver, dvs i alla länder som tillåter obegränsad användning av trådlös teknik och marknadsförda kemiska ämnen ... *att inte vidta åtgärder leder till kostnader för samhället* och är inte längre ett alternativ ... vi varnar enhälligt för *en allvarlig fara för folkhälsan* ... att stora *förebyggande åtgärder vidtas och prioriteras för att förhindra en kommande världsomspännande epidemi.*"

## Försiktighetsåtgärder

Försiktighetsprincipen (UNESCO) antogs av EU 2005: "*När mänskliga aktiviteter kan leda till moraliskt oacceptabla skador som är vetenskapligt trovärdiga men osäkra, ska åtgärder vidtas för att undvika eller minska dessa skador.*"

Resolution 1815 (Europarådet, 2011): "*Vidta alla rimliga åtgärder för att minska exponeringen för elektromagnetiska fält, särskilt för radiofrekvenser från mobiltelefoner, och särskilt exponeringen för barn och ungdomar som verkar löpa större risker för hjärntumör...* Rådet rekommenderar kraftfullt tillämpning av försiktighetsprincipen ALARA (As Low as Reasonable Achievable) både för så kallade termiska effekter som icke-termiska eller biologiska effekter av elektromagnetiska fält eller strålning" och att (8.5) "*förbättra metoder för och kvaliteten på de riskbedömningar som görs.*"

Nürnberg-koden (1949) gäller för alla experiment på människor och därmed även utrullningen av 5G med nya och högre frekvenser av RF-EMF. Alla sådana experiment: "*bör baseras på tidigare kunskaper (t ex en förväntan härledd från djurförsök) som motiverar experimentet. Inget experiment bör genomföras, där det finns en a priori anledning att tro att dödsfall eller invalidiserande skador kommer att uppstå. Förutom möjligen i experiment där de experimenterande läkarna också själva tjänar som försökspersoner (Nürnbergkod punkt 3-5). Redan publicerade vetenskapliga studier visar att det nu finns "a priori anledning att tro" att hälsofarorna är reella.*"

Europeiska miljöbyrån (EEA) varnar för "*strålningsrisk från vanliga apparater*", även om strålningen underskrider WHO / ICNIRP-normerna. EEA påpekar också följande: "*Det finns många tidigare exempel på att försiktighetsprincipen inte tillämpats, vilket har resulterat i allvarliga och ofta irreversibla skador för människors hälsa och miljön... den skadliga exponeringen kan bli omfattande innan man har "övertygande bevis" för skada av långvarig exponering och en biologisk förklaring [mekanism] för hur denna skada orsakas.*"

## "Säkerhetsriktlinjerna" skyddar industrin - inte hälsan och miljön

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De nuvarande "säkerhetsriktlinjerna" från ICNIRP är helt föråldrade. Alla bevis på skador som anges ovan har nämligen uppstått trots att strålningen är under ICNIRPs "riktlinjer". Därför behövs nya riktlinjer. Anledningen till de vilseledande riktlinjerna är "ICNIRP-medlemmarnas intressekonflikter i form av deras relationer med telekommunikations- eller elektronikföretag vilket undergräver den opartiskhet som bör gälla för utarbetande av exponeringsstandarder för allmänhetens exponering för RF-EMF... För att utvärdera cancerrisker är det nödvändigt att inkludera forskare med kompetens inom medicin, särskilt onkologi" (cancerforskning).

De nuvarande riktlinjerna från ICNIRP / WHO för RF-EMF bygger på ett ett föråldrat antagande att "den kritiska effekten av RF-EMF-exponering för människors hälsa och säkerhet är uppvärmning av exponerad vävnad." Men forskare har bevisat att många olika typer av sjukdomar och skador uppstår helt utan uppvärmning ("icke-termisk effekt") vid strålningsnivåer långt under ICNIRP-riktlinjerna.

## Vi uppmanar EU:

- 1) Att vidta alla rimliga åtgärder för att stoppa 5G RF-EMF-expansionen tills oberoende forskare kan garantera att 5G och de totala strålningsnivåerna som orsakas av RF-EMF (5G tillsammans med 2G, 3G, 4G och WiFi) inte kommer att vara skadliga för EU-medborgare, särskilt barn, foster och gravida, eller för miljön.
- 2) Att rekommendera att alla EU-länder, särskilt deras strålsäkerhetsmyndigheter, följer Resolution 1815 och informerar medborgare, inklusive lärare och läkare om hälsorisker från RF-EMF-strålning, hur och varför man ska undvika trådlös kommunikation, särskilt i/nära t.ex., daghem, skolor, hem, arbetsplatser, sjukhus och äldreomsorg.
- 3) Att omedelbart utse en arbetsgrupp inom EU bestående av oberoende, verkligt opartiska forskare inom EMF- och hälsa utan intressekonflikter<sup>1</sup> för att omvärdera hälsoriskerna och att:
  - a) besluta om nya, säkra gränsvärden för "maximala totala exponering" för all trådlös kommunikation inom EU,
  - b) studera den totala och kumulativa exponeringen som påverkar EU-medborgarna,
  - c) skapa regler som ska tillämpas inom EU för att undvika exponering som överstiger EU:s nya gränsvärden för maximala totala exponering för alla typer av EMF så att man skyddar medborgare, särskilt barn, foster och gravida kvinnor.
- 4) Att förhindra att elektronik/telekomindustrin genom sina lobbyorganisationer övertalar EU-tjänstemän att fatta beslut om att ytterligare öka RF-strålning, inklusive 5G i Europa.
- 5) Att stöda och genomföra kabelburen digital telekommunikation istället för trådlös.

*Vi förväntar oss ett svar från EU senast den 31 oktober 2017 om vilka åtgärder ni kommer att vidta för att skydda EU-invånarna mot RF-EMF och speciellt 5G-strålning. Denna appell och ert svar kommer att offentliggöras.*

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<sup>1</sup> Undvik liknande misstag som när Kommissionen (2008/721/EC) utsåg industrivänliga medlemmar till SCENIHR, vilka till EU överlämnade en missvisande SCENIHR rapport om hälsorisker, som gav telekomindustrin fria händer att bestråla EU-medborgare. Rapporten citeras nu av strålsäkerhetsmyndigheter inom EU.



# 5G-appellen

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*The endorsements are personal and not necessarily supported  
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## 5G-appellen

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# 5G-appellen

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