

**Date:** February 23, 2019

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**Re: Docket ID: DOT-OST-2018-0210 - Vehicle to vehicle communication safety problems, ADA violation, need for EIS and biologically-based safety standards minimizing RF exposures in vehicles**

Dear Sir or Madam,

**I am writing to request that you halt the proposed rule-making process.** Mandating V2V communication in vehicles will have disastrous public health and environmental consequences. The Department of Transportation (DOT) can no longer hide behind compliance of wireless technology with FCC limits as a justification for mandating wireless technology (like V2V). **No less than three Federal agencies have found that those limits do not protect public health from harm during continuous exposures to radiofrequency radiation such as V2V communication will cause.**

Thus, it is imperative that DOT open a supplemental NPRM on radiofrequency exposure in cars with the aim of minimizing both the immediate and long-term hazard it poses. Additionally, DOT must halt implementation of the V2V mandate while a National Environmental Policy Act (NEPA) review of the environmental and human health impacts and an Environmental Impact Statement (EIS) are completed.

## **Background**

### **Radiofrequency Pollution in Cars**

Cars have long been a problem for people with radiofrequency (RF) sickness, an environmentally-induced functional impairment with disabling and potentially life-threatening effects caused by over-exposure to RF. All sources of RF exposure can potentially cause RF sickness. Soviet research estimates that RF sickness normally takes 3-5 years of exposure to develop, depending on exposure levels and personal characteristics (Inglis 1970). Symptoms of RF sickness also vary depending on personal characteristics, other environmental pollutants, and the RF exposure (Dodge 1969). Common causes of RF sickness include overexposure to radiation from wireless technology, "dirty" electricity, and exposure to "*Incidental*" and "*Unintentional*" radiators. In recent years, however, cars have become so polluted with wireless technology that they are causing symptoms for people who did not previously have RF sickness.

Cars have always contained RF generating elements. FCC regulates what are called "*Incidental*" and "*Unintentional*" Radiators, as well as "*Unlicensed Intentional*" Radiators, Industrial, Scientific, and Medical (ISM) Radiators, and Licensed Radiators. The regulations governing "*Incidental*" and "*Unintentional*" radiators are not related to protecting human health at all. They are solely designed to prevent RF interference with other devices. These regulations have encouraged "hardening" of

electronics receiving the RF interference almost as much as reducing "*Incidental*" and "*Unintentional*" RF emissions.

We now know that the human body is extremely sensitive to that same interference. **Since the human body cannot be "hardened" to prevent "noise" (a source of radiofrequency (RF) exposure) from affecting it, regulations need to be tightened substantially to make technology safe.** Currently, polluting technology is causing serious health problems. Cars are one area that is becoming particularly problematic.

**For safety reasons, regulations governing "*Intentional*", "*Unintentional*", and "*Incidental*" radiators in cars need much tighter regulatory control.**

### **Brief General Information about Hazards of Radiofrequency Radiation**

Three U.S. Government Agencies have acknowledged that the FCC RF limits do not protect people from experiencing biological effects when exposed chronically to levels of RF radiation commonly found in our environment and such as V2V communication will emit.

- In 2018, the U.S. National Toxicology Program (NTP) released final results showing that **exposure to non-thermal levels of RF radiation causes cancer and DNA breakage. Furthermore, a replicated European toxicology study showed that RF radiation promotes cancer growth** (<https://ehtrust.org/clear-evidence-of-cancer-from-cell-phone-radiation-u-s-national-toxicology-program-releases-final-report-on-animal-study/>). This alone provides an important basis for tightening regulations on "*Intentional*", "*Unintentional*", and "*Incidental*" RF levels in cars.
- The Department of Interior stated "**the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today.**" ([http://www.ntia.doc.gov/files/ntia/us\\_doi\\_comments.pdf](http://www.ntia.doc.gov/files/ntia/us_doi_comments.pdf))
- The Environmental Protection Agency stated "**The FCC's current exposure guidelines, as well as those of the Institute of Electrical and Electronics Engineers (IEEE) and the International Commission on Non-ionizing Radiation Protection, are thermally based, and do not apply to chronic, nonthermal exposure situations.** They are believed to protect against injury that may be caused by acute exposures that result in tissue heating or electric shock and burn. The hazard level (for frequencies generally at or greater than 3 MHz) is based on a specific absorption dose-rate, SAR, associated with an effect that results from an increase in body temperature. **The FCC's exposure guideline is considered protective of effects arising from a thermal mechanism but not from all possible mechanisms.** Therefore, the generalization by many that the guidelines protect human beings from harm by any or all mechanisms is not justified." (emphasis added) ([http://www.emrpolicy.org/litigation/case\\_law/docs/noi\\_epa\\_response.pdf](http://www.emrpolicy.org/litigation/case_law/docs/noi_epa_response.pdf)). As the EPA makes plain, the FCC RF radiation limits are not protective from all adverse effects only those from thermal mechanisms during acute exposures. FCC RF radiation limits are based on thermal effects in a large male. They are not population-protective.

They do not and were never intended to protect from biological effects or even thermal effects during chronic exposures such as V2V communication will cause.

There is increasing consensus within the research community that existing RF limits are not protective. Two hundred twenty scientists from 42 countries with over 2,000 peer-reviewed journal articles to their collective credit in the field of biological impacts from RF/EMF appealed to the U.N. and the WHO for greater precautions with regard to exposures from wireless technologies (<http://www.emfscientist.org>). Many other nations are taking precautionary action (<http://ehtrust.org/policy/international-policy-actions-on-wireless/>), the U.S. ought to be as well.

Even professional organizations are beginning to grudgingly acknowledge the inadequacy of the limits for protecting the public health of the population. **The International Commission on Non-Ionizing Radiation Protection (ICNIRP)** states:

*"Different groups in a population may have differences in their ability to tolerate a particular NIR (non-ionizing radiation) exposure. For example, children, the elderly, and some chronically ill people might have a lower tolerance for one or more forms of NIR exposure than the rest of the population. Under such circumstances, it may be useful or necessary to develop separate guideline levels for different groups within the general population, but it may be more effective to adjust the guidelines for the general population to include such groups. Some guidelines may still not provide adequate protection for certain sensitive individuals nor for normal individuals exposed concomitantly to other agents, which may exacerbate the effect of the NIR exposure, an example being individuals with photosensitivity."* from ICNIRP STATEMENT, GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION PROTECTION, (HEALTH PHYSICS 82(4):540-548; 2002) <https://www.icnirp.org/documents/philosophy.pdf>

After the NTP results were released, the **Institute for Electrical and Electronics Engineers (IEEE)** posted an article with comments from Kenneth Foster of the IEEE committee that reviews RF radiation exposure limits:

*"With the NTP study results, Foster expects more governments to put out cautionary guidelines and radiation labeling for cellphones. He says he wouldn't be surprised if California adds RF radiation to its Proposition 65 list of carcinogenic chemicals, and if the IARC ups its classification rating from 2B: possibly carcinogenic to humans to 2A: probably carcinogenic to humans. "And they wouldn't be out of line in doing that," he says. "This is going to change the rhetoric in the field. People can point to much more hard evidence that [cellphone RF exposure] really is a problem."* (<http://spectrum.ieee.org/the-human-os/biomedical/ethics/cellphone-radiation-causes-cancer-in-rats>)

Cellular Telephone Russian Roulette ([http://microondes.files.wordpress.com/2010/03/robert\\_c\\_kane\\_cellular\\_telephone\\_russian\\_roulette.pdf](http://microondes.files.wordpress.com/2010/03/robert_c_kane_cellular_telephone_russian_roulette.pdf)), written by Robert C. Kane, a former Motorola engineer, discusses the fact that numerous studies show that significant biological effects occur at such low levels that useful wireless technology is by definition unsafe wireless technology. He further discusses the problem of microscopic, but biologically harmful hot spots which occur at levels far below those normally considered to cause thermal harm.

## **Radiofrequency Pollution a Serious Safety Issue in Cars Cardiac Arrest**

A number of studies show that electromagnetic radiation, including radiofrequency radiation, alters heart rate variability, blood pressure (including inducing hypertension with microwave exposure) and increases risk of arrhythmia related heart disease and heart attack. (Mahra et al 1971)(Cherry 2000) (Havas et al 2010)(Havas and Marrongelle 2013)(Havas 2013) Both these cardiac effects are pre-disposing factors toward cardiac arrest. *Cardiovascular Disease: Time to Identify Emerging Environmental Risk Factors* looks at links between RF exposure and cardiovascular disease and discusses evidence for a causal link (Bandara and Weller, 2017).

**Cardiac arrhythmias can be caused by wireless technology.** Recent replicated double blind studies show that a cordless phone base station operating at WiFi frequencies can cause cardiac arrhythmias in susceptible individuals (Havas et al 2010)(Havas and Marrongelle 2013)(Havas 2013). This short video discusses the cardiac effect that wireless can have-[http://www.youtube.com/watch?v= EI9fZX4iww](http://www.youtube.com/watch?v=EI9fZX4iww). View this video <http://www.youtube.com/watch?v=sv1E9IXUd6M> to see further discussion. You can read the studies at <http://www.magdahavas.com/wordpress/wp-content/uploads/2012/01/Havas-HRV-Ramazzini.pdf> and <http://www.ncbi.nlm.nih.gov/pubmed/23675629#>.

A recent study in rabbits found that not only did WiFi change heart function parameters, but it dramatically changed the cardiac effects of both dopamine and epinephrine (Saili et al 2015). A mouse cardiac study showed that mice exposed to RF radiation from a cellphone had significantly lower vitamin D levels, low calcium, low antioxidant capacity, low cardiac tissue MDA and elevated renin levels compared to controls. The mice also had enlarged left ventricles and ECG abnormalities (Fatma 2011). Cellphone radiation was the causal factor. Both these cardiac effects are pre-disposing factors toward cardiac arrest. Obviously, these serious cardiac effects caused by RF radiation exposures from consumer devices should preclude it and them from cars.

**Cardiac arrest is undesirable at any time but when a person is operating a large potentially lethal object like an automobile or truck, it is particularly so.**

Cars and trucks should not have wireless technology in them and they should have shielded compartments for the storage of consumer wireless technology during transport. Furthermore, other sources of RF exposure in cars should be minimized through good engineering by automobile manufacturers. It is imperative that DOT and National Highway Traffic Safety Administration (NHTSA) begin the process of mandating good low-RF engineering in all vehicles.

The very serious consequences of cardiac arrhythmia or cardiac arrest while operating a vehicle should impel the DOT and NHTSA to tighten RF limits on all classes of RF emitters in vehicles.

### **Cognitive and Neurological Impairment**

A review of old Soviet literature discusses the fact that **reflexes, including conditioned reflexes, are slower in individuals exposed to RF.** They go on to state "It is possible to observe degeneration of the neurons in the cerebral cortex and the basal ganglia, the pons, the medulla oblongata, and in some cases even the cerebellum, as well as histological and chemical changes in the vicinity of nerve

fibers." **Obviously, it is not a good idea to have an environmental toxin that can impair reflexes and damage nerves inside vehicles whose safe operation relies on those very reflexes and good neurological and brain function.** (Mahra et al 1971)

Many more people are adversely affected by RF radiation than realize it. Radiation from wireless devices may exacerbate the effects of a distraction such as conversation and impair reflexes and slow brain processing even at the lower levels phones emit when not connected. This may occur in part due to RF lowering dopamine levels (Buchner and Eger 2011) or thyroid levels (Eskander 2012), as well as the other effects mentioned above.

“A Comparison of the Cell Phone Driver and the Drunk Driver” shows delays in reaction times that may relate to the RF emissions from the phone (Strayer et al 2006). Unfortunately, driving studies have not been designed to examine whether it is the RF emissions of the phones that are causing the problem. In “Examining the Impact of Cell Phone Conversations on Driving Using Meta-Analytic Techniques,” the authors state “There was a similar pattern of results for passenger and remote (cell phone) conversations.”(Horrey and Wickens 2006) However, it is not clear whether both driver and passenger had their cellphones on and emitting at the time of the conversation, which would obviously be a confounder. “Measuring Cognitive Distraction in the Automobile,” a recent report on distracted driving also provides data additional technology in cars may not be safe (Strayer et al 2013). Unfortunately, the potential effect of the RF exposure itself whether from transmitters, electronics, or the vehicle electrical system was not factored into the experimental design. An article with the great title "[A Problem of the Brain, Not the Hands: Group Urges Phone Ban for Drivers](#)" probably has it right - although perhaps not for the right reason. Radiation from cellphones does indeed interfere with brain function, thus it may matter little whether the driver is conversing on a phone they hold, hands-free, or, indeed, with a passenger, as long as phones are on in the car or the area is high in wireless radiation. Ambient microwave radiation levels have gotten quite high in many metropolitan areas.

### **Public Health Implications of Radiofrequency Pollution in Cars**

There are long-term public health implications of wireless radiation exposure. Detrimental biological effects, distinct from tissue heating effects, have been extensively documented in studies at a range of different frequencies and at levels below the current United States safety standard (Cherry 2000)(Hyland 2000)(Santini 2003). Many other nations already have more rigorous safety standards than does the US. Microwave and radiofrequency radiation are now being associated with attention deficit disorder, autism, sleep disorders, multiple sclerosis, Alzheimer’s disease and epilepsy, as well as asthma, diabetes, malignant melanoma, breast cancer, and other illnesses that have become increasingly more common. Please see [www.bioinitiative.org](http://www.bioinitiative.org) to read a 2012 review of the peer-reviewed science on the long-term risks of exposure to transmitted microwave and radio frequency radiation. Studies finding no health effects are predominantly industry funded (Huss 2007).

Blood cancers like leukemia and lymphoma are tied to RF exposure in numerous epidemiological studies (Cherry 2000). So, the fact that these cancers are increasing as RF exposures are increasing (including RF exposure from “dirty” electricity) should cause government agencies to try to minimize societal RF exposures and, therefore, cause the DOT to halt the V2V communication program since it will result in additional ambient RF exposure and increase societal cancer rates.

Non-Hodgkins lymphoma is increasing 4% per year over a time period which would have seen large increases in RF exposure (<https://academic.oup.com/jnci/article/93/7/494/2906510>). Furthermore, a major risk factor for Non-Hodgkins lymphoma is immune impairment which RF exposure causes, so a causal link is likely. Leukemia has also seen a rapid increase in rate (35%) over a similar time period (1975-2016) (<http://www.georgiahealthnews.com/2016/10/childhood-cancer-rates-rising-why/>).

An important increase in exposure to radiofrequency radiation occurred in the 1970's with the installation of energy efficient lighting. The home computer and consumer electronics also caused increases. Finally, wireless technology has caused very large increases in exposure in recent years.

Colon cancer rates and rectal cancer rates among young people are rising dramatically, [http://www.huffingtonpost.com/entry/colorectal-cancer-rates-rising-young-adults\\_us\\_58b622c9e4b0a8a9b78716a2](http://www.huffingtonpost.com/entry/colorectal-cancer-rates-rising-young-adults_us_58b622c9e4b0a8a9b78716a2). Young people often rest their laptops, tablets, or smart phones on their abdomens, resulting in very high exposures to wireless radiation, other radiofrequency radiation resulting from the operation of the laptop, and high ELF magnetic fields, which are shown to be related to miscarriage <https://www.nature.com/articles/s41598-017-16623-8> and <https://ehtrust.org/science/pregnancy-wireless-and-electromagnetic-fields/>. Taken together, these increases in cancer and the link to miscarriage should strongly deter the DOT from mandating further exposure to wireless radiation, as would occur with mandated V2V communication. The harm caused will far outweigh the benefits.

Independent reviews such as "[Criticism of the Health Assessment in the ICNIRP Guidelines for Radiofrequency and Microwave Radiation \(100 kHz - 300GHz\)](#)", first completed on behalf of Ministry of Health/ Ministry for the Environment of New Zealand, and the BioInitiative Report, written by highly qualified independent scientists ([www.bioinitiative.org](http://www.bioinitiative.org)), conclude that there are biological effects at levels well below existing safety limits. Both reviews find existing RF limits to be completely inadequate.

In light of the very serious threat that RF poses to public health, limiting exposure to RF in vehicles from all sources makes sense.

There are numerous studies linking proximity to cell towers/base station antennas with adverse health outcomes (<http://www.bioinitiative.org>). V2V communication would cause vehicles, highways, and roads to be similarly dangerous.

### **Availability of Low RF Cars Required by 2008 American's with Disabilities Act Amendments and Section 504 of the Rehabilitation Act**

Radiofrequency sickness is a functional impairment caused by overexposure to radiofrequencies, which includes the pulsed modulated microwave frequencies used in wireless communication, as well as "Incidental" and "Unintentional" radiators (Mahra et al 1971)(Cherry 2000)(Grant)(Johnson Liakouris 1998). Once one has radiofrequency sickness, exposure to radiofrequencies causes functional impairments which can range from frustrating to life-threatening. EHS or electrohypersensitivity, which often encompasses radiofrequency sickness, affected 3% of the population twelve years ago, according to the California State Department of Health. More recent independent studies show the numbers may be higher now.

The proliferation of wireless technology is increasing the number of people with radiofrequency sickness and also restricting the daily activities of people with radiofrequency sickness. Past rules changes by the NHTSA have made it more difficult for people with radiofrequency sickness to get vehicles that do not cause functional impairment for them - one example of an access-limiting requirement is the requirement for wireless tire pressure gauges. While the radiation levels emitted are below the FCC guidelines, that is irrelevant in terms of biological symptoms and safety, as previously discussed. A rules change that results in minimizing RF levels in vehicles would benefit everyone, improving public health, but it would particularly benefit the growing segment of the population experiencing RF sickness.

**The FCC and the National Highway Traffic Safety Administration would violate Section 504 of the Rehabilitation Act and the intent of the 2008 ADA Amendments if they proceed with V2V communication, thereby further isolating and disabling people with radiofrequency sickness. In compliance with Section 504 of the Rehabilitation Act and the intent of the 2008 ADA Amendments they should act to make personal vehicles and roadways safe for persons with radiofrequency sickness. Private vehicles are often the only way people with radiofrequency sickness can travel due to the rampant proliferation of wireless technology.**

Requiring that vehicles be engineered to minimize EMF/RF would be consistent with the [\*EUROPAEM \[European Academy for Environmental Medicine\] EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses\*](#) states, "*The primary method of treatment should mainly focus on the prevention or reduction of EMF exposure, that is, reducing or eliminating all sources of high EMF exposure at home and at the workplace.*" The Guideline provides strong support for initiating regulations to minimize EMF/RF in vehicles since the authors emphasize the importance of making changes necessary to include those already injured by RF/EMF in society and reiterate and support the statement by Hedendahl, Carlberg, and Hardell that "*It is time to consider ELF EMF and RF EMF as environmental pollutants that need to be controlled.*" (Belyaev 2016)

The functional impairment that occurs with RF radiation exposure varies depending on the particular frequencies involved, their amplitude, and the duration of exposure and the size, height, and build of the exposed person. Headache, brain-fog, short-term memory loss, scattered thinking, irritability, nerve pain, muscle weakness, heart palpitations, and appetite loss are common. Longer stays in polluted environments intensify and worsen the symptoms. (Mahra et al 1971)

Halting development of V2V technology and requiring minimization of the RF in cars would benefit public health, the environment, and the inclusiveness of society, providing persons with radiofrequency sickness a safe method of travel and allowing them to fully exercise their civil rights.

### **Regulatory Action Needed to Minimize RF Exposure in Vehicles**

It is important that the DOT, National Highway Traffic Safety Administration and the FCC Office of Engineering and Technology work together to promulgate rules related to vehicle engineering to minimize RF exposure from all sources within vehicles to improve overall vehicle safety and minimize RF impaired driving. For public health reasons, it is important that vehicles not cause radiofrequency sickness in previously well individuals. To satisfy the intent of the Americans with Disability Act and Section 504 of the Rehabilitation Act, there must be well-engineered vehicles that are accessible for people with radiofrequency sickness available at prices comparable to ordinary stripped-down vehicles.

### **Regulatory Recommendations to Minimize RF Exposure in Vehicles:**

- **Prohibit wireless transmitters in vehicles, includes V2V transmitters.**
- **Require shielded compartments in all vehicles for storage and transport of wireless devices.**
- **Require all "Incidental" and "Unintentional" RF emitters be engineered so that they comply with [Kazakhstan health standards](#) which require that no more than 50 G/S units of "dirty" electricity, as measured by [Stetzerizer "dirty" electricity meter](#), is allowed on building wiring. This can be done through a combination of good engineering of components, shielding, filters (capacitive filters often work well), and ferrites. Further toxicology studies should be initiated to determine if that level needs to be lowered due to the closeness of electrical wiring to vehicle occupants. "How to Approach the Challenge of Minimizing Non-Thermal Health Effects of Microwave Radiation from Electrical Devices" by Dr. Martin Pall provides a good basic approach to setting RF limits to prevent adverse biological effects.**
- **Require use of a neutral wire positioned in a conformation with the hot wire so as to minimize electromagnetic fields and prohibit use of the vehicle chassis for returning current.**
- **Minimize driver exposure to electromagnetic fields - e.g. prohibit video displays on the back of the driver's headrest and require careful positioning of wires and wire bundles.**

### **Background on Need For Regulatory Action**

Radiation from wireless devices is not the only source of exposure to RF in cars. High frequency signals on wiring also occur in cars and cause radiofrequency sickness and public health problems. Milham and Morgan found a dose-response relationship between high frequencies present on building wiring and cancer (Milham and Morgan 2008). Removing high frequencies on building wiring has improved MS symptoms, blood sugar levels, asthma, sleep quality, teacher health, headaches, ADD, and numerous other health problems (Havas and Olstad 2008)(Havas 2008)(Havas 2006). Technical papers provide a solid electrical and biomolecular basis for these effects. A recent paper by Ozen showed that transients induce much stronger current density levels in the human body than does the powerline 60Hz signal (Ozen 2007). Another technical paper discusses the authors' findings that high frequency communication signals on power lines also induce much stronger electrical currents in the human body than a low frequency signal of the same strength (Vignati and Giuliani 1997). The induced currents disturb normal intercellular communications. This causes harmful short-term and long-term effects. The effects seem to be similar whether the system is AC or DC since the most biologically active component is the "noise" from poorly engineered devices. (Please see [www.electricalpollution.com](http://www.electricalpollution.com) for more information.)

Electrical engineering and biological sciences are largely separate disciplines. Biologists, molecular biologists, and doctors have been largely unaware of the high frequency pollution of electrical systems (AC and DC). The assumption, until recently, by biologists was that AC and DC systems were "clean". This is not so and has not been so for many many years. This has been well known by electrical engineers, but they have been taught that from a biological standpoint it is insignificant, after all the pollution, even in extreme cases, usually does not amount to much more than a couple of volts and in many cases is measured in millivolts. However, the assumption of safety is proving not to be true



(Milham and Morgan 2008)(Havas and Olstad 2008)(Havas 2008)(Havas 2006)(Ozen 2007)(Vignati and Giuliani 1997). This shows the importance of establishing vehicle standards that reflect the biological reality, especially since any biological impairment caused by poor engineering could cost lives. If proper standards are established, and the above mentioned references offer a good basis for establishing initial standards, safe un-polluted cars can be engineered. This would benefit everyone in the long run and decrease the isolation of people with radiofrequency sickness.

### **Mechanisms by which Radiofrequency Radiation has significant biological effects at very low levels.**

There is extensive documentation in the literature of alterations of Ca<sup>2+</sup> homeostasis.(Cherry 2000) This is likely to be responsible at least in part for the profound effects that radiofrequency radiation has on the heart and neurological function. Ca<sup>2+</sup> regulates gap junction opening. Gap junctions are key in many intercellular communications. "*Microwave electromagnetic fields act by activating voltage-gated calcium channels: why the current international safety standards do not predict biological hazard*" has concrete suggestions for how to quickly enact a first revision of the FCC RF safety limits to protect against many of the biological effects of exposure to RF (Pall 2014). RF can have serious psychological effects, including anxiety, irritability, and depression. Links are also made to psychosis and other psychological disorders (Pall 2015). With all the problems with road rage etc., the last thing this country needs is for drivers or passengers to be exposed to any more RF in their vehicle than absolutely necessary. There is plenty of evidence to justify a meaningful initial revision of FCC vehicle safety codes to minimize RF exposure from all sources within vehicles while further study is done to determine the shape of future revisions.

A review by Yakymenko, et al., 2015, *Oxidative Mechanisms of Biological Activity of Low-intensity Radiofrequency Radiation* finds in 93 of 100 reviewed studies a wide pathogenic potential of the induced Reactive Oxygen Species (ROS) and their involvement in cell signaling pathways which explains a range of biological/health effects of low intensity RF radiation, including both cancer and non-cancer pathologies. Their concluding analysis demonstrates low-intensity RF radiation is an impressive oxidative agent for living cells with a high pathogenic potential and that the oxidative stress induced by RF radiation exposure should be recognized as one of the primary mechanisms of the biological activity of this kind of radiation (<http://www.mainecoalitiontostopsmartmeters.org/wp-content/uploads/2015/07/Yakymenko-et-al-2015.pdf>).

Exposure to radiofrequency radiation also interferes with the action of enzymes, signaling pathways, and makes the immune system simultaneously hyperactive and less effective.(Cherry 2000)(Johansson 2009) Immune impairment results in part from the disruptive effect of radiofrequency radiation on calcium ion homeostasis. In addition to radiofrequency radiation-induced immune impairment increasing risk of various types of infection, it is likely to increase the risk of getting cancer from the DNA breakages radiofrequency radiation is well-documented to induce. Now also substantiated by the NTP results. While radiofrequency radiation is non-ionizing, the metabolic changes it can cause result in oxidative damage to DNA and subsequent breakage. Direct interactions between radiofrequency radiation and DNA can have similar results, as well as causing changes in gene transcription, through changes in electron flows induced by the radiation.

Neurological function can be seriously impaired by radiofrequency radiation. Cholinesterase enzyme activity is impaired by exposure to radiofrequency radiation in a manner similar to impairment caused

by organophosphate pesticides, often rendering a person with radiofrequency sickness particularly sensitive to small amounts of chemicals (Grant). Radiofrequency radiation can lower the pain threshold, slow reaction times, cause fatigue, muscle weakness, headaches, difficulty concentrating, short-term memory problems and even memory loss (Mahra et al 1971)(Johansson 2009)(Blank and Goodman 1999)(Johnson Liakouris 1998). These may be caused by disruption of Ca<sup>2+</sup>, disruption of various enzyme pathways, induction of the stress response and associated effects, increased permeability of the blood-brain barrier, or various other effects of over-exposure to radiofrequency radiation (Mahra et al 1971)(Cherry 2000)(Grant).

Radiofrequency radiation significantly decreases melatonin levels, causing poor quality sleep, and also decreases the ability of existing melatonin to fight cancer (Cherry 2000).

## **Radiation from Wireless Technology Harms the Environment**

### **RF radiation kills and damages trees**

Trees are being killed and damaged across the U.S. and world-wide. RF radiation is being implicated as the cause. Several studies show the very serious effects that RF radiation has on the health of trees. Trees are essential to the welfare of the global environment and the continuation of the human race. Decimation of the Amazon rainforest by direct human actions has been oft-cited as endangering the global environment. The DOT and NHTSA should not be moving forward with implementing a technology, V2V communication, that will hasten the RF-caused death of our urban and rural forests by raising ambient RF radiation levels. Please read the following papers to see the toll RF is already taking on trees. We cannot afford additional forest die-off. Large mature trees are being seriously damaged and killed. This damage will take 50 years or more to repair.

- Radiofrequency radiation injures trees around mobile phone base stations [https://www.researchgate.net/publication/306435017\\_Radiofrequency\\_radiation\\_injures\\_trees\\_around\\_mobile\\_phone\\_base\\_stations](https://www.researchgate.net/publication/306435017_Radiofrequency_radiation_injures_trees_around_mobile_phone_base_stations)
- Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings: Preliminary Observations <https://www.hindawi.com/journals/ijfr/2010/836278/>
- Electromagnetic Fields Act Similarly in Plants as in Animals: Probably Activation of Calcium Channels via Their Voltage Sensor: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3780531/>

### **RF radiation harms wildlife**

Please read the following reports which demonstrate that wireless technology is causing serious harm to wildlife:

- “The Report on Possible Impacts of Communication Towers on Wildlife Including Birds and Bees” commissioned on 30th August 2010 by the Ministry of Environment and Forest, Government of India [http://www.moef.nic.in/downloads/public-information/final\\_mobile\\_towers\\_report.pdf](http://www.moef.nic.in/downloads/public-information/final_mobile_towers_report.pdf)
- “Impacts of radio-frequency electromagnetic field (RF-EMF) from cell phone towers and wireless devices on biosystem and ecosystem – a review” [http://www.biolmedonline.com/Articles/Vol4\\_4\\_2012/Vol4\\_4\\_202-216\\_BM-8.pdf](http://www.biolmedonline.com/Articles/Vol4_4_2012/Vol4_4_202-216_BM-8.pdf)

- Balmori, A. "Electromagnetic pollution from phone masts. Effects on wildlife," Pathophysiology (2009), doi:10.1016/j.pathophys.2009.01.007 <http://www.ncbi.nlm.nih.gov/pubmed/19264463>

The following compelling lay-friendly reports show vividly the serious environmental harm that wireless technology is causing to wildlife.

- **Report detailing the exodus of species from the Mt. Nardi area of the Nightcap National Park World Heritage Area during a 15-year period (2000-2015)**, a report for the United Nations Educational Scientific and Cultural Organization, highlights the very serious environmental damage that radiation from wireless technology can cause.. [http://www.electricalpollution.com/documents/Mt Nardi Wildlife Report to UNESCO 2016.pdf](http://www.electricalpollution.com/documents/Mt_Nardi_Wildlife_Report_to_UNESCO_2016.pdf)  
"Subject: The correspondence of species disappearance from the Mt. Nardi-Mt. Matheson area of the World Heritage Site with the application of an increasing amount of electromagnetic technology designated as electromagnetic radiation (EMR) and electromagnetic frequencies (EMF)."
- **Birds and Trees of Northern Greece: Population Declines since the Advent of 4G Wireless**, a call to action as important as "The Silent Spring" was years ago. <http://www.electricalpollution.com/documents/Birds&TreesNorthGreece.pdf>

In short, V2V communication, other wireless technologies, and polluting electrical technology are unsafe and access-limiting and should not be present in vehicles. V2V communication would further marginalize people with radiofrequency sickness in violation of the American's with Disabilities Act and endanger the public health and the environment. Halt implementation of the V2V mandate while a National Environmental Policy Act (NEPA) review of the environmental and human health impacts and an Environmental Impact Statement (EIS) are completed. Please act to protect the health and rights of the citizens of this great country by opening an NPRM specifically in order to promulgate rules to minimize RF levels in vehicles.

Thank you.

Sincerely,

Catherine Kleiber

**References:**

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