



UNITED STATES CONGRESSIONAL RESEARCH AND LEGISLATIVE PROPOSALS TO EDUCATE THE AMERICAN PEOPLE ABOUT THE POWER DENSITY SAFETY OF WIRELESS COMMUNICATIONS ($\mu\text{W}/\text{M}^2$)

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ABSTRACT The purposes of this article are to provide research and legislative recommendations to the United States Congress to increase education of and protection from adverse health conditions associated with wireless communications. I discuss 48 adverse health conditions caused by radio frequency field radiation (RFFR) and hypothesize that the decline in labor force productivity and increases in depression and contemplation of suicide rates of college students may be caused by RFFR. I offer 11 research suggestions including determining if an RFFR source is more dangerous indoors than outdoors, whether RFFR interfere with the Schumann Resonance and/or human brain waves, and if there is a natural limitation of RFFR beyond which an individual becomes electromagnetic hypersensitive. I propose seven legislative activities including creation of a new federal agency to support research of and protection from RFFR-emitting equipment, and notices of RFFR power densities expressed in $\mu\text{W}/\text{m}^2$ on RFFR-emitting equipment and in enclosed public spaces housing Wi-Fi.

KEYWORDS : Radio frequency harm to humans, Wi-Fi and cell phones adverse health conditions, Research and legislative protection from cell phones

I. Introduction

During the past five years I have been engaged in research of health management literature to produce Six Pillar Tips for Health Management (SPT) the latest edition of which is Edition 25, June-July 2017 [1]. The principal objective of SPT is to provide readers with a Six-Pillar classified set of health recommendations to guide their life style from strategic planning and vision building through reduction of stress and pollution to symptom relief using alternative and complimentary medicine, and dietary planning.

In June 2014, I began to research the literature of electromagnetic fields (EMFs), which include magnetic fields and electric fields, radio frequency field radiation (RFFR), and dirty electricity; my principal interest in EMF research became radio frequency field radiation because of the explosive growth of RFFR-emitting cell phone base stations, cell phones, Wi-Fi, smart meters, and cordless phones. My initial research findings were published in SPT October 2014 and updated continuously since then. In my research of the literature and occasional home inspections of EMFs, I have become deeply concerned with the potentially catastrophic health consequences of wireless technology. I have found what appears to be overwhelming evidence that RFFRs cause cellular changes, symptoms, and illnesses in humans and rats which I call "adverse health conditions." Further, there is inferential evidence that RFFRs are causing injury to broad classes of Americans so severe that it could lead to the decline in human health and economic productivity of our civilization—which appears to have already begun.

I have reached these conclusions from a broad background in academic fields of engineering and business, and business experience in accounting, business valuation, engineering, engineering economics, finance, law, statistics, real estate appraisal and investment, and history. Indeed, my PhD dissertation, *The Great Bong Bungle*, was a historical analysis of a 15-year land use problem caused by United States Air Force abandonment of the partial construction of a joint intercontinental bomber-fighter interceptor base in southeast Wisconsin. This PhD research, in conjunction with five history courses I took at Stanford University, has made me uniquely sensitive to the importance of evaluating present events in the context of their future environmental effects, and building hypotheses predicting the future from present statistical data.

The scope of this article is to offer evidence supporting the probable harm to humans from radio frequency field radiation, offer U.S. Congressional proposals for research issues which should lend support to the safety of or harm from RFFR, and Congressional legislative proposals to educate and protect the American people from the harm from RFFR, if such harm exists based upon medical evidence. This article began with an unsolicited report I sent to Senator Catherine Cortez-Masto on November 9, 2017, which has been article-revised to internalize citations and expand ideas.

II. Evidence linking 48 adverse health conditions in humans and rats to RFFR wireless equipment

A. Scope of research selections for the 48 symptoms

The scope of the research of the literature in this section are from medical studies showing a causal relationship between electromagnetic fields (generally RFFR but a few examples of magnetic fields) and adverse health conditions of cellular damage, adverse symptoms, and/or illnesses in humans or rats induced mostly by RFFR. I would estimate that at least 80 percent of the medical research articles I have read concluded there were causal links between RFFRs and adverse health conditions, but these are not necessarily a random sample of all medical research articles relating adverse health conditions to RFFR.

Indeed, not all would agree with my selection of the medical research articles in this section. In their 2004 "International Workshop on EMF Hypersensitivity," the World Health Organization reported that the symptoms of electromagnetic hypersensitivity are "certainly real" but that "...there presently is no scientific basis to link EHS with EMF exposure." Further, WHO recommended treatment options focusing on "health symptoms" including "...assessment... of indoor air pollution, excessive noise, poor lighting (flickering light) or ergonomic factors" and psychiatric causes. [2]

In their 2005 summary of the 2004 workshop, WHO stated that "The collection of symptoms is not part of any recognized syndrome." and "Treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home." [3] In 2014, WHO stated "To date, research does not suggest any consistent evidence of adverse health effects from exposure to radio frequency fields at levels below those that cause tissue heating." [4]

In my opinion, the level of evidence to support a causal relationship between RFFR and adverse health conditions for public health organizations to inform the public of a health hazard from wireless personal property is not a *global* body of "consistent evidence" but rather evidence from a measurable *subset* of medical research evidence *within* the global body that provides a consistent causal link between EMFs and adverse health conditions. "Subset" refers to those medical research studies that show a causal link between any adverse health condition and RFFR for a variety of adverse health conditions. Indeed, it is a sample of these subsets showing a causal relationship between EMFs—principally radio frequencies—and adverse human health that I am providing in the material which follows in this section.

B. The 48 adverse health conditions caused by RFFR

In my research of the literature linking RFFR emissions from wireless equipment to adverse health conditions, I have found 48 adverse health conditions in humans and rats that have been shown to be caused by wireless equipment (e.g., cell phone base stations, cell phones, Wi-Fi, smart meters, cordless phones). The sources for the 48 adverse conditions are clinical research studies and the opinions of medical professionals with references for each provided at the end of this report.

The list of 48 (20 listed under "Adverse human health conditions from RFFR-emitting sources" plus 28 (29-1=28) numbered adverse health conditions) are listed in the order of importance, understandability, and category association.

1. *Adverse human health conditions from RFFR-emitting sources:* Questionnaire research has indicated about 20 adverse human health conditions from RFFR-emitting sources including sleep disturbances (1), headache (2), depression (3), fatigue (4), dysesthesia (5), concentration dysfunction (6), memory changes (7), dizziness (8), irritability (9), anxiety (10), nausea (11) skin buffing or warming (12), EEG changes (13) and others. [5] In one study of 25 individuals exposed to radio and TV broadcasting transmitters, it was found they suffered from somatization (multiple symptoms with no discernable organic cause) (14), obsession-compulsion (15), paranoid states (16), and sleeping disturbances (17). [6] In a study of 17,000 individuals, 31% of respondents in Norway and 13% in Sweden reported at least one symptom from cell phone use of warmth on the ear, burning sensation on the face, and/or headaches. [7] In a Spanish study, it was found that those living near a cell phone base station suffered from discomfort, irritability, appetite loss (18), fatigue, headache, difficulty concentrating, and sleep disturbances. [8]. In a review of ten studies, reviewers found increased incidence of adverse neurobehavioral symptoms or cancer for individuals living less than 500 meters from cell phone base stations; power output of all were within international guidelines indicating guidelines are inadequate. [9] Thirty-seven individuals living under a mobile phone base station and 48 opposite the station reported a significantly higher prevalence of neuropsychiatric symptoms such as headache (23.5%), memory changes 28.2%), dizziness (18.8%), tremors (9.4%; 19), depressive symptoms (21.7%), and sleep disturbances (23.5%) than controls. [10] In a questionnaire survey of EHS individuals in Japan, symptoms reported were fatigue/tiredness (85%) and headache-concentration-memory-thinking (81%). Sixty-five percent (65%) experienced health problems due to radiation from other passengers' mobile phones in trains or busses and 12% reported they could not use public transportation. Fifty-three percent (53%) had a job before the onset of EHS, but most had lost their job or had reduced income. [11] In a questionnaire study of 206 EMH individuals, it was found that the most common symptoms were nervous system related disorders of stress (60.3%), sleeping disorders 59.3%), and fatigue (57.2%). Seventy-six percent (76%) reported reduction or removal of the sources helped in full or partial recovery. [12] Mobile phones caused marked changes in the C-fiber nerves in the scalp. [13; #20]
2. *Fetuses: Increased risk of brain damage.* Pregnant rats were exposed to 900 MHz radio frequency 60 minutes per day during gestation (carrying of embryo). Four weeks after birth it was found that there was a decrease in the number of granule cells in the dentate gyrus in the rats' brain hippocampus. [14]
3. *Fetuses: Miscariages* In an occupational setting, mothers exposed to microwaves were more likely to have miscarriages and the rate was dose dependent. [15]
4. *Children, Attention Deficit Hyperactive Disorder (ADHD):* About 3-7% of school aged children suffer from ADHD and the rate is growing about three percent per year since 1997. ADHD children have deficiencies in working memory controlled by neurons in the prefrontal cortex. In a study of in-utero (pregnant) rats exposed to radiofrequencies similar to cell phones/Wi-Fi, it was found that after birth the rats were hyperactive and had impaired memory caused by altered neuronal development in the prefrontal cortex. Thus, there appears to be a causal link between ADHD and exposure to radio frequencies from cell phones, Wi-Fi, cordless phones, and other sources of radio frequencies during pregnancy. [16]
5. *Children, behavioral difficulties:* In a study of 13,159 children exposed before or after birth to cell phones, the odds ratio was 1.80 the children had behavioral difficulties or were hyperactive at the beginning of school. Since this study was completed in 2006 before extensive cell phone use, the present odds ratio may be much higher. [17] Children living near a radio station in Latvia were found to have reduced developed memory, attention, reaction time, and neuromuscular apparatus vs. control group. [18] Exposure to 2450 MHz radio frequency field for prenatal and postnatal rats resulted in increased total oxidant stress and oxidative stress indicating chronic stress, postnatal growth restriction, and delayed puberty. [19] In a study of children and adolescents exposed to radio frequencies for 24 hours, 7% of the children and 5% of the adolescents showed abnormal behavior. [20]
6. *Children, myelin sheath, damage to:* The myelin shield protects the electrical activity of brain neurons and develops from mid-gestation to two years of age and through adolescence. It is adversely affected by radio frequency fields. [21][22]
7. *Children: Dry eye disease.* Up to 9.1% of children had dry eye disease which improved when smartphone use discontinued for four weeks. [23]
8. *Brain damage: Brain neuronal damage* was found in the cortex, hippocampus, and basal ganglia in rats exposed to two hours of GSM. [24] Rat brain exposed to 15 minutes of 900 MHz RF induced glial (cells which surround neurons) and neuronal damage and changes in the dopamine transporters. [25] Rats exposed to 900 MHz RF for one hour per day for 28 days showed reduced number of Purkinje cells in the cerebellum. [26] Oxidative stress in the brain increased from cell phone use and reduced by melatonin; oxidative stress continued for 40 and 60 days after end of exposure. [27] Humans exposed to a GSM 900 cell phone for 45 minutes showed intracordal excitability in the brain near the cell phone. [28]
9. *Cancer, brain tumors: Glioma and acoustic neuroma.* Research of the Hardell group of studies found odds ratios of 1.71 for cancer of the temporal lobe, 1.81 for acoustic neuroma, and 2.29 for Ipsilateral cumulative use. Cordless phone use increased the odds ratios for glioma and acoustic neuroma. [29]
10. *Cancer, leukemia: Radio frequencies of 2.48 GHz increase lipid peroxidation and proliferation of leukemia cancer cells.* [30]
11. *Cancer, parotid (salivary) gland.* Mobile phones have a causal relationship with parotid gland tumors for regular cell phone users or high-power density conditions with odds ratios of about 1.50. [31]
12. *Cancer, various organs: Radar technicians exposed to high levels of RFFR for long periods are candidates for cancer if various organs including melanoma of the eye, testicular cancer, nasopharyngioma, non-Hodgkin's lymphoma, and breast cancer.* [32]
13. *Cancer: heat shock proteins: Chronic expression of heat shock proteins are a known cause of oncogenesis, metastasis, and/or resistance to anti-cancer drugs.* The hypothesis is that cell phone radiation triggers repetitive stress leading to heat shock proteins and, thereby, cancer. Heat shock protein HSP 70 increased after 4 hours of 1800 MHz exposure suggesting that cell phones may cause cancer from extended cell phone use. [33][34]
14. *Calcium ion changes: Exposure to 2.48 MHz radio frequency field led to an increase in calcium ion efflux and ornithine decarboxylase activity with a decrease in calcium-dependent protein kinase.* These changes promote cell proliferation and differentiation leading to tumors. [35]
15. *Melatonin reduction: There is evidence that EMFs disrupt and reduce melatonin perhaps because the pineal gland interprets EMFs as light.* Melatonin is a very powerful anti-oxidant, is believed to defeat several types of cancer, and enhances sleep. [36][37]
16. *Blood brain barrier, increased permeability of.* After one, non-thermal GSM exposure of two hours increases in the BBB was found seven days later, and dark and damaged neurons after 14 days. [38][39]
17. *DNA damage: In a study of 900 MHz, 1800 MHz, and 2450 MHz radio frequencies applied to rats for 30 days, it was found that brain DNA strands were broken indicating damage to brain DNA from radio frequencies similar to cell phones and Wi-Fi.* [40][41]
18. *Eye damage: Rats were exposed to Wi-Fi for one hour per day for 30 days resulting in statistically significant lower glutathione peroxidase (GSH-Px), an enzyme family that protects the eye from oxidative damage.* Melatonin supplementation reversed the damage, but radio frequency radiation reduces natural melatonin and if you do not take melatonin supplements the lens damage may be permanent. [42]
19. *Cataracts: Mobile telephone radiation leads to oxidative stress in the corneal and lens tissues and Vitamin C may help to correct.* [43]
20. *Stress, sleep disturbances, and depression: A one-year follow up study of 4,156 young adults (20-24 years of age) found a correlation between mobile phone exposure (frequency of use, availability, awakened at night, personal overuse) and stress, sleep*

- disturbances, and symptoms of depression for men and women. [44]
21. Heart, adverse influence on: It was found that 2.48 GHz radio frequency for 60 minutes per day for 28 days increased lipid peroxidation (*i.e.*, free radicals steal electrons from lipids such as fats and fat-soluble vitamins leading to damaged molecules) in the heart and decreased concentrations of Vitamins A, C, and E. Improvements were shown by supplementation with selenium and L-carnitine. [45] RFRs increased oxidative stress in the heart. [46]
 22. Sperm damage. Study of 361 men in fertility clinic had reduced sperm count, motility (moving properly through the female reproductive tract), viability, and normal morphology (size and shape of sperm under microscope; >14% normal) as daily cell phone usage increased from zero, <2 hours daily, 2-4 hours daily, and to >4 hours daily usage. [47]
 23. Testes damage: Rats were exposed to 2.437 GHz Wi-Fi for 24 hours per day for 20 weeks resulting in a significant increase in serum 8-hydroxy-2-deoxyguanosine levels and 8-hydroxyguanosine staining indicating DNA damage in the testes due to Wi-Fi exposure. [48] The exposure in this experiment for 24/7 may be similar to anyone living at home with the WiFi on 24/7.
 24. Thyroid hormones: A 2480 MHz radiofrequency field decreased thyroid hormone T3, increased T4, and caused hyperactive and aggressive behavior after 16-21 days. [49]
 25. Electromagnetic hypersensitivity (EMH): EMH is a collection of symptoms including redness, tingling, burning sensations, fatigue, tiredness, concentration difficulties, dizziness, headaches, nausea, heart palpitations, digestive disturbances, etc. [2] In October 2014, the World Health Organization of the United Nations stated, "To date, no adverse health effects have been established as being caused by mobile phone use...Further research has not been able to provide support for a causal relationship between exposure to electromagnetic fields and self-reported symptoms or 'electromagnetic hypersensitivity'." [4] In a study of 23 individuals claiming EHS it was demonstrated that transcranial magnetic stimulation resulted in alternations to the central nervous system from altered cortical excitability showing that there ARE objective measures of a causal relationship between EMH claims and changes in body function indicating that EMH is a real, not imagined illness. [50]
 26. Autoimmune processes: In a study of the effect of 2.450 GHz on autoimmune processes, it was found that there was a non-thermal effect on autoimmune processes measured by increases in formation of antibodies in the brain, which did not appear to be pathological, and possible adverse effects of blood serum affecting pregnancy and fetal development. [51]
 27. Inflammation: Radio frequency radiation of 2.48 GHz significantly increased lung multinucleated giant cells associated with inflammation formed by fusion of macrophages as a measure of pulmonary stress. [52]
 28. Internet addiction disorder: Research indicated that internet addiction disorder results in multiple structural changes in the brain. [53]
 29. Gene expression, changes in. It was found that a radio frequency field of 2.48 GHz changed 221 genes in two hours of exposure and 759 in six hours for human cultured HL-60 cell genes through a non-thermal mechanism. [54]

This list of 48 adverse health conditions in humans and rats is the first set of data I provide in this report to support the research and legislative proposals I offer in Sections VI and VII.

III. Evidence supporting my ability to specify and support medical hypotheses: Prevention and treatment of Post-Traumatic Stress Disorder

As a result of my membership in the Newport Beach Sunrise Rotary Club (NBSRC), their association with Wounded Warrior Battalion West at Camp Pendleton, and my publishing *Six Pillar Tips for Health Management* [1] on the NBSRC web site for 19 editions starting in January 2013, I hypothesized that excess stimulants (*e.g.*, caffeine, refined carbohydrates, electromagnetic fields) were contributing to Post-Traumatic Stress Disorder (PTSD). Because I had access problems to Camp Pendleton personnel after I objected to their not providing dietary intervention for PTSD victims to reduce stimulants, I contacted the office of Senator Diane Feinstein and had a meeting with one of her staff members; he asked me to write a report to support my

stimulants/PTSD hypothesis. This led to "Recommendations to Prevent and Treat Post-Traumatic Stress Disorder for Military Personnel" [55] Notably, one research article ["Strom in a Coffee Cup."] linked caffeine to PTSD.

I recommended elimination of caffeine, reduction of refined carbohydrates, increased sleep, metaphysical modeling, improved indoor air quality, and reduction of electromagnetic fields to prevent and treat PTSD for military personnel.

I am offering this PTSD hypothesis-based research article as evidence that I have the ability and training to develop medical hypotheses with supportive research in the absence of academic or career medical training. Indeed, I have found that interest, focus, and concentrated research are the keys to developing and supporting new ideas to solve business and societal problems. Further, in my research as an engineer with the Internal Revenue Service for 30 years, I frequently worked financial issues that had unique intellectual components and utilized principles of accounting, business valuation, economics, federal (for rules and economic models) and state (for rights in property) statutory and case law, finance, and statistics.

IV. Hypothesis: Wireless technology may be causing potentially catastrophic harm to humans

As I began to research the literature linking wireless equipment in June 2014 for the October 2014 issue of *Six Pillar Tips for Health Management*, I began to build the following hypotheses or predictions of future harm to humans from wireless equipment:

1. There would be a decline in the Labor Force Productivity annual growth rate because proven damage to rat brains probably applied to humans.
2. There may be a similarity between the delayed symptoms from brain damage from contact-sport concussions (Chronic Traumatic Encephalopathy, CTE, or nerve damage) and delayed symptoms from brain damage from wireless technology estimated by some medical professional at about ten years. Presently, I have no evidence linking concussion brain damage to RFFR brain damage, but there is evidence of delayed-onset brain damage from RFFR.
3. Human depression rates would increase. I provide evidence of this below.
4. Human suicides and suicide contemplation rates would increase. I provide evidence of this below.
5. Drug use would increase because of adverse changes in mental condition from depression, contemplation of suicide, and other mental problems. The epidemic in opiate use may support this hypothesis, but I expect increases in recreational drug use.
6. There may be increases in violent crime. Presently, I have no specific evidence this is occurring, but I am suspicious that some of the mass shootings may be influenced by RFFRs from wireless equipment.
7. Working lives would decline from the mid-60s to the mid-50s and perhaps even lower because of damage to human cells and organs. Presently, I have no evidence this is occurring.

V. Statistical evidence supporting my hypothesis that wireless equipment is causing potentially catastrophic harm to humans in the United States

A. Declines in Labor Productivity: 2011-2016

Table 1 shows Labor Productivity for 2000-2016. Based upon this data and other older data not shown, I have concluded that the expected labor productivity is about 3.0% coming out of a recession compared with average labor productivity of 0.5% from 2011 to 2016 when wireless technology had been used extensively for many years. This is a decrease of over 80%. Labor productivity is the key to increasing incomes and if the decline in Labor Productivity continues, our standard of living will stagnate and perhaps decline.

Table 1: Decline in Labor Productivity 2000 to 2016

"Bureau of Labor Statistics" "Major Sector Productivity and Costs" "Original Data Value" "Labor productivity (Output per hour)"			
Year	Increase	Year span	Av Prod
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2000	3		
2001	2.7		

2002	4.4		
2003	3.7		
2004	3.1		
2005	2.1	2000-5	3.2
2006	0.9		
2007	1.6		
2008	0.8	2006-8	1.1
2009	3.1		
2010	3.3	2009-10	3.2
2011	0.1		
2012	0.9		
2013	0.3		
2014	0.8		
2015	0.9		
2016	0.2	2011-16	0.5

B. Increases in depression and suicide contemplation rates for college students

Table 2 Percentage of respondents who “Felt so depressed that it was difficult to function at any time in the last 12 months.” and who “Seriously considered suicide.”

	Depression	Suicide
Fall 2008	30.6%	6.4%
Spring 2009	30.7	6.0
Fall 2010	28.4	6.0
Spring 2010	30.7	6.2
Fall 2010	28.4	6.0
Spring 2011	31.1	6.4
Fall 2011	30.3	6.6
Spring 2012	31.3	7.1
Fall 2012	29.5	6.9
Spring 2013	31.3	7.4
Fall 2013	30.9	7.5
Spring 2014	32.6	8.1
Fall 2014	33.5	8.7
Fall 2015	35.3	9.6
Spring 2016	36.7	9.8
Fall 2016	38.2	10.4

Table 2 data is taken from the semi-annual survey of about 33,500 college students by The American College Health Association National College Health Assessment. The questions were “Felt so depressed that it was difficult to function at any time in the last 12 months” and “Seriously considered suicide.” The percentages shown are for males and females combined. Depression rates have increased from 30.6% in the Fall of 2008 to 38.2% in the Fall of 2016 for an average increase of about one percent per year. But most of the increase has been from Fall 2013 (30.9%) to Fall 2016 (38.2%), a three-year span, for an average rate of increase of 2.4%. If these rates of increase continue, the adverse health effects on college students and their aging cohort groups will be catastrophic.

Table 2 also indicates that suicide contemplation rates have increased steadily from 6.0% in Spring 2009 to 10.4% in Fall 2016, or 0.6% per year. The suicide contemplation rates in conjunction with the increases in depression and 48 adverse health conditions discussed elsewhere indicate potentially catastrophic health problems in the future. Notably, Jenny Fry, a UK teenager, committed suicide because of Wi-Fi at school. [56]

VI. Proposed research issues for the RFFR-oversight/education/protection federal agency

A. Research Issue #1: The institutional setting for research—a proposed RFFR-oversight/education/protection agency

In June 1994, the United States Air Force's Rome Laboratory published a report summarizing harm to humans from radio frequencies and microwaves. [57] The report listed a number of known adverse biological effects mostly attributable to the nonthermal effects shown in medical studies cited in the report. These biological effects included radiation burns on dogs visibly appearing weeks after exposure (p. 3), hyperthermia (4), disruption of blood vessel integrity in the brain (4), fever (4), fatigue (4), injury to the blood brain barrier

(4), increases in cancer rates (5, 8), cellular mutagenic effects (5), damage to chromosomes (6) lymphoblastoid transformations (6), aberrations in the cardiovascular system (e.g., increase in heart rate) (7-8), changes in the heart rate (7), changes in bone marrow (8), damages to the central nervous system (8-9), behavioral changes (9) damages to the immune system (11), cataracts and other damage to the eye that can result in loss of vision (11-12), buzzing noise emanating from the head (13), etc.

Given that harm from wireless communications was known in June 1994, the federal government should have commenced research, education, and protection activities prior to the extensive proliferation of cell phones. Having failed that, it is now essential to (1) confirm my research findings of adverse health conditions from RFFRs in the literature with independent research findings, (2) educate and inform the American people of the potential harm to humans from wireless technology if the medical research findings of adverse health conditions is correct, and (3) protect the American people by controlling the use of wireless equipment. To accomplish these tasks, I recommend creating a new federal agency because the Environmental Protection Agency has contributed to the present problems of grossly excessive power density standards and no education to the American people of potential harm from RFFR.

Presently, the federal government does not appear to be conducting any research studies to support the safety or show harm from RFFR-emitting equipment. Further, the FCC/RCRF has such high limits of dangerous power densities—up to 10,000,000 $\mu\text{W}/\text{m}^2$ – in contrast to IIRBE safety limits of well less than 1000 $\mu\text{W}/\text{m}^2$ that it is essential for Congress to review scientific data with a view to lowering these limits through the NCRF, a Congressional corporation.

The strategic objectives of this oversight/education/protection agency would be to:

1. Review and set power density standards for RFFR emitting equipment and facilities based upon $\mu\text{W}/\text{m}^2$ to assure the long run safety of the American people.
2. Fund research to determine if there is a causal link between RFFR and adverse health conditions and assure that foreign research groups are included in the funding activity.
3. Set standards to notify the public of RFFR power densities associated with wireless equipment at point-of-sale and in enclosed spaces (e.g., buildings including spill-over space in buildings, automobiles, busses, aircraft).
4. Set and implement standards for environmental impact statements for RFFR-emitting equipment.
5. Suggest and implement assistance to those suffering from electromagnetic hypertension.
6. Work with Congress in the safe use of wireless communications.
7. Manage strictly the integrity of its funded and internalized research.

B. Research issue #2: Fund general research to test hypotheses that a causal relationship exists between RFFRs and potential adverse health conditions.

I have provided a list of 48 adverse human health conditions caused by RFFRs from medical research articles and opinions of experts. I recommend that the RFFR-federal oversight/education/protection agency review these adverse health conditions and others and fund integrated research to test whether there are causal relationships between varying power density RFFRs and adverse human conditions. The power densities should emulate those emitted by cell phones, Wi-Fi, cordless phones, cell phone base stations, and other RF emitting equipment being sensitive to emissions that are a function of signal strength—as signal strength declines, cell phone search power densities increase dramatically. I have metered RFFRs up to 25,000 $\mu\text{W}/\text{m}^2$ from RFFR-emitting equipment including Wi-Fi, cell phones, cordless phones, and cell phone base stations.

C. Research issue #3: Do RFFRs decrease melatonin in the body of individuals in the radiation field?

One important and relatively simple research issue is whether melatonin is reduced in the bodies of individuals in the presence of the radiation field, which has been found in existing research. Melatonin reduction by RFFRs is important because (1) melatonin is an extraordinarily important nutrient as a super anti-oxidant and as a contributor to good sleep—it is very important to sleep in a very dark room to generate melatonin, (2) adequate levels of melatonin are

believed to prevent and defeat cancer, (3) research suggests melatonin interprets RFFRs as light and shuts down, (4) the melatonin/RFFR relationship can be *quickly* tested for the precise relationship to various power densities of RFFRs to melatonin reduction, and (5) if there is a strong negative relationship (i.e., high power density/low levels of melatonin), it would lend support for further research linking RFFRs to harm to humans.

D. Research issue #4: Does RFFR-emitting wireless equipment in enclosed spaces (e.g., buildings, automobiles, trucks, busses, aircraft) cause more human harm than the same power density (measured in $\mu\text{W}/\text{m}^2$) equipment in open spaces?

Faraday Cages are metal enclosures designed to keep RFFRs *outside* the Cage. When RFFR-emitting equipment is placed *inside* an enclosure of metal, glass, stone, metal-reinforced concrete, painted dry wall, etc., I believe the power density fields measured in $\mu\text{W}/\text{m}^2$ (micro watts per square meter) are magnified because they bounce off the enclosed space walls just as RFFRs bounce off the outside enclosure of a Faraday cage. In essence, these enclosed spaces become reverse Faraday cages by *containing* RFFRs within the enclosure. I have found no RFFR research literature that has mentioned or addressed the issue of increased harm to humans inside an enclosure vs. the same power density outdoors.

In my opinion, there is a near 100% chance that equal power density RFFR-emitting equipment magnifies harm to humans in enclosed spaces vs. outdoors. It is important to understand the magnitude of this additional harm from endogenous RFFRs because of the extensive use of cell phones and Wi-Fi in buildings, automobiles, busses, and aircraft occupied by pregnant women, children, and adults. For example, busses with Wi-Fi may have power densities of $12,500 \mu\text{W}/\text{m}^2$ (12.5 times an extreme anomaly by IIBBE and less than one percent of maximum FCC/NCRF safety standards) net of exogeneous (e.g., cell phone base stations) and other endogenous sources (e.g., passenger/driver cell phones) of RFFR emissions.

E. Research issue #5: Do recommended power densities set by the Institut fur Baubiologie + Okologie IBN and accepted by the International Institute of Building Biology and Ecology provide more reliable limits of safe exposure to RFFRs than the FCC/NCRP limits?

The radio frequency guidelines for sleeping areas set by the Institut fur Baubiologie + Okologie IBN (German) and accepted by the International Institute of Building Biology and Ecology (IIBBE) in $\mu\text{W}/\text{m}^2$ (micro watts per square meter) are as follows:

Table 3: Building Biology Evaluation Guidelines for RFFRs in sleeping areas

Radio-frequency radiation	No Anomaly	Slight Anomaly	Severe Anomaly	Extreme Anomaly
$\mu\text{W}/\text{m}^2$ (micro watts per square meter)	<0.1	0.1 – 10	10-1000	>1000

"Anomaly," in the context of RFFRs, refers to a power density that is in excess of the power densities that would exist were wireless-equipment RFFRs not present. It is an unsatisfactory abnormality that is interpreted by building biologists as a concern for human health but is not referenced to a specific adverse human condition.

The data in FCC OET Bulletin 65 (August 1997) [58] indicates that the safety limit for radio frequencies of 1000 MHz (a common frequency of cell phones) is a power density of $0.67 \text{ mW}/\text{cm}^2$ (a nice small number...) which translates to $6,666,667 \mu\text{W}/\text{m}^2$ (...until you translate it to $\mu\text{W}/\text{m}^2$) and for 1500 MHz is $1.00 \text{ mW}/\text{cm}^2$ which translates to $10,000,000 \mu\text{W}/\text{m}^2$. These FCC power density safety limits compare with an IIBBE Extreme Anomaly of $1,000 \mu\text{W}/\text{m}^2$. Thus, the FCC safety limits for 1000 MHz are 6,666 times the IIBBE Extreme Anomaly and for 1,500 MHz are 10,000 times the IIBBE Extreme Anomaly based upon the Institut fur Baubiologie + Okologie IBN accepted by the International Institute of Building Biology and Ecology (IIBBE). The safety limits for IIBBE is based upon the opinions of a panel of ten experts (nine German and one American) from its German counterpart organization, Institut fur Baubiologie + Okologie IBN. The German standards are reviewed by IIBBE annually. Hereinafter, the term "IIBBE" in reference to RFFR power density standards refers to Institut fur Baubiologie + Okologie IBN

(German) power density standards accepted after annual review by the International Institute of Building Biology and Ecology (United States).

The FCC/NCRP standard recognizes cellular damage from heat but does not recognize cellular damage from any other RFFR adverse attribute or differential damage to fetuses, children, and adults even though the Bolen/Rome report indicated non-thermal damage to cell and organs in 1994. [57] Fetuses and children absorb much more radiation because of their thinner skulls.

The last time the FCC/NCRP standard was reviewed was in August 1997 before the vast increase in wireless equipment. Thus, the time has come for Congress to review the FCC/NCRP RFFR power density standards in the light of (1) the explosive growth of wireless equipment since August 1997, (2) the lack of government-funded research on the adverse health effects of radio frequency field radiation, (3) 48 adverse health conditions caused by RFFRs I have found in medical research literature (4) scientific support I offer for my hypotheses that wireless equipment may be causing the decline in Labor Force Productivity from about three percent to 0.5 percent and increasing depression and suicide contemplation rates of college students, and (5) the failure of the FCC/NCRP standard to consider harm to humans from other than cellular damage from heat, (6) the failure of the FCC/NCRP standard to consider the differential damage

Indeed, Congress should investigate the qualifications and criteria of the ten-member German committee that sets RFFR standards with a view to accepting the German standard used by its American counterpart, IIBBE, unless Congress finds flaws in the German standard-setting procedures. The FCC/NCRP standard of up to 10,000 times the IIBBE Extreme Anomaly standard (i.e., $10,000,000 \mu\text{W}/\text{m}^2$ for FCC/NCRP vs $1,000 \mu\text{W}/\text{m}^2$ for IIBBE) is preposterous for the immediate human environment.

For further comments on excess FCC/NCRP safety limits see Legislative Proposal #1.

F. Research issue #6: Is there a link between delayed onset CTE brain damage from concussions and delayed onset symptoms of brain cancer and other brain damage from RFFRs.

It is well known that symptoms from CTE from concussions generally do not occur during contact-sport playing years but occur after retirement from the sport. It is further believed, based upon limited evidence, that symptoms from damage to the brain from cell phone use most typically begins many years later—ten years later is the commonly predicted guideline time period. Thus, the ten-year delayed onset to symptoms of brain damage from cell phone use may be related directly to the recent growth in college students' depression rates starting in 2013, about ten years after the beginning of heavy cell phone usage.

The research issue is whether there is similarity in brain damage between concussions and cell phone use; indeed, there is scientific evidence of neuronal brain damage to rats from cell phones. If there is similarity between brain damage from concussions and cell phone use, it would lend support to the serious long-term harm from wireless equipment. Concussion brain damage research has generally found that athletes with at least ten years of contact sports have an approximate 95 percent chance of suffering from CTE later in life. [59]

G. Research issue #7: Does Wi-Fi damage plant seeds from growing?

Several Danish teenagers, who were having sleep problems with Wi-Fi, experimented with plant seeds placed in water in two rooms, one with Wi-Fi and the other with no Wi-Fi. They discovered the seeds in the room with Wi-Fi died while the plant seeds in the room without Wi-Fi grew normally. [60] This research must be conducted in a controlled scientific experiment funded by the RFFR-oversight agency to determine if the results of the Danish teenagers can be replicated. If they are, it would be partial evidence that Wi-Fi is harmful to living cells and organs.

H. Research issue #8: Is there a causal link between the Schumann Resonance (SR) and human brain waves, and do RFFRs from cell phone base stations, cell phones, Wi-Fi, smart meters, and/or cordless phones interfere with the Schumann

Resonance or human brain waves independent of the SR thus destabilizing the human brain?

The Schumann Resonance is generated in the Ionosphere from lightning strikes, has a principal frequency of 7.83 Hz (7.83 cycles per second), additive harmonics at about 5-6 Hz (1st harmonic at 13 Hz), and a range up to about 60 Hz although some sources indicate a somewhat higher frequency. Human brain waves have a range of up to about 60 Hz as well. Some have hypothesized that the RFFRs of human brain waves are derived from the SR, and indeed if the SR were removed, life on our planet would become unbearable because of harm to humans. [61]

There is evidence that humans, separated from the Schumann Resonance (e.g., underground bunkers and perhaps outer space in enclosed capsules), may become ill until the SR is restored to their environment. [62] I have tried to trace the original article on the underground bunker experiments of Rutger Wever at the Max Planck Institute in Germany without success (phone calls at 4:00 AM to Germany), and NASA and the Russian space agency to determine if the SR is added to United States or Russian space craft. NASA sent me articles on the SR, but neither they nor the Russian space agency has answered my e-mail inquiry regarding adding the SR to space craft to promote human health in space. Since neither has responded to my question regarding adding the SR to space craft, I assume it is secret and that it is probably added to space craft. If true, this would affirm the importance of the SR to support human life.

The extended importance of having continuous human access to the SR is two-fold. First, if high-energy, RFFR emitting equipment interferes with the reception of the SR by the human brain, RFFRs may be harmful to the brain and other organs as indicated in the alleged bunker experiments of Rutger Wever. Second, independent of the SR-human brain frequencies interdependency, RFFR emitting equipment may interfere directly with human brain RFFRs, and perhaps other RFFRs in the human body. This may demonstrate human cell and organ damage from non-heat (SAR) sources of RFFRs and undermine dramatically the FCC/NCRP safety standards protection which disregards non-heat harm to humans.

Indeed, research describing the relationship of the SR to human life could unleash a treasure of information about human existence and our interdependency with the NATURAL environment—an environment free of massive, additive RFFRs from wireless equipment.

I. Research Issue #9: Issue: Does EMF radiation have a cap for each person beyond which a person is more likely to be afflicted with EMH and are there functional relationships that affect the cap?

To the best of my present knowledge, there has been no research linking non-ionizing radio frequencies with a maximum amount beyond which a person enters EMH. But as research proceeds in these other areas, it would be wise to be alert to the amount of non-ionizing radiation different individuals may sustain before they become EMH. Indeed, there may be a relationship between the total RFFR and other unique human attributes. [63]

J. Research Issue #10: Are there objective bodily changes that occur when individuals who claim to be Electromagnetic Hypersensitive (EMH) are in the presence of a measurably high RFFR?

The World Health Organization states that “To date, no adverse health effects have been established as being caused by mobile phone use.” [4] I have provided 48 adverse health conditions shown by clinical research to be caused by RFFRs and Langrebe [50] has shown altered nervous system function by those claiming EMH.

Thus, I propose research of potential bodily changes suffered by EMH claimants thus showing that EMH is an actual illness and providing these individuals special protection in the law and rights to claim financial damages as appropriate.

K. Research Issue #11: What can be done to accommodate individuals who suffer from electromagnetic hypersensitivity (EMH)?

It is generally accepted that at least three percent of the population has EMH and is suffering from one or more symptoms they believe are caused by RFFRs. In one case, Jenny Fry, a UK teenager committed suicide because of Wi-Fi in her school. [56] Further, I have identified

48 adverse health conditions caused by RFFRs and a hypothesis inferentially linking the decline in labor productivity and increases in depression and contemplation of suicide to RFFRs. EMH individuals could also influence adversely the labor force participation rate.

The issue is what is being done to accommodate individuals with EMH under current RFFRs and how this will change when wireless 5G is placed on telephones poles on every urban block. A few ideas follow:

1. Recognize that the percentage of EMH individuals will increase, but we will not know the expansion of these percentages unless there is medical monitoring and reporting to a central federal health agency.
2. Set aside areas in every city which are RFFR-free to accommodate those with EMH. Unfortunately, these people must work and travel to areas which may not be RFFR-free.
3. Set aside specific cities and geographical areas that are RFFR-free. One of these already exists on the east coast.
4. Disregard EMH-sensitive individuals and face the consequences of more homeless, more violent crime, more poverty, and other degenerate processes to further weaken our society to assure money flows to those producing RFFRs in the form of more cell phone base stations, cell phones, Wi-Fi, smart meters, and cordless phones with no regard for their adverse consequences to human life.
5. Reign in the expansion of wireless technology.
6. Expand federal legislation to prohibit the expansion of cell phone base stations until there has been at least five years of federal RFFR-oversight agency monitoring of present and future RFFR systems and finding all, including wireless 5G, are safe. It is my understanding that wireless 5G will expand the broadband from about 6 GHz now to 100 GHz. Presently, RFFR meters measuring over 10 GHz are rare and expensive.

VII. Proposed legislation for the United States Congress

A. Strategic objectives of U.S. Congressional legislative proposals

The federal legislative proposals I suggest in this section are intended to educate, inform, and protect the American people from the potential danger from wireless technology and have the following strategic objectives:

1. Understand the scope of human harm from (1) wireless equipment emissions based upon the 48 adverse health conditions supported by medical research in this report, (2) my hypotheses related to declines in labor force productivity and increases in depression and contemplation of suicide by college students, and (3) any other scientific evidence uncovered by the oversight/education/protection agency.
2. Correct the natural inertia that exists when one uses technology believed to be safe and gives so much personal pleasure when the technology is harmful.
3. Increase the education of all Americans regarding the metered measurement of power densities in $\mu\text{W}/\text{m}^2$ as a negative attribute of wireless equipment.
4. Further the education of Americans by labeling all products sold with wireless communications at point-of-sale with near (i.e., MF, EF) and far field (i.e., power densities in $\mu\text{W}/\text{m}^2$) EMF/RFFR strength. These labels will assist purchasers of equipment or devices with wireless communications to become aware of the radiation power intensity of this equipment in $\mu\text{W}/\text{m}^2$.
5. Further the education of Americans by demonstrating how RFFR-emitting equipment spills over into adjacent housing units in multifamily housing. In one case, I discovered a $900 \mu\text{W}/\text{m}^2$ power density in an apartment bedroom when the outside power density was about $200 \mu\text{W}/\text{m}^2$ and the Wi-Fi and cell phones were turned off in the subject apartment. This indicated the likelihood of neighboring Wi-Fi (horizontally and/or vertically) broadcasting a $700 \mu\text{W}/\text{m}^2$ power density into the subject apartment. The intrusion of a power density into another's real estate constitutes a probable trespass violation under state law, acts as a stimulant to disturb sleep, and may injure cells and organs in the spillover housing unit. While education of spillover RFFRs is a portion of the solution for multifamily housing safety, prohibitions against spillover RFFRs should be included in the solution. Remember, fetuses and young children have very thin skulls and absorb much higher amounts of RFFRs and must be accorded special protection from spill-over RFFR under trespass

law. Notably, the FCC/NPRC SAR safety standard has no provision recognizing non-heat injury to cells and organs or the thinner skulls of fetuses and children.

6. Set standards for environmental impact statements for selected sources of RFFRs in urban areas.
7. Demonstrate how hard-wired routers and Ethernet cables (connecting the land line telephone with the computer) may be used as substitutes for Wi-Fi and reduce substantially power densities in enclosed spaces. This could reduce power densities up to $5,000 \mu\text{W}/\text{m}^2$ (and perhaps more) from Wi-Fi in the source and spillover apartment—I have measured $4,000 \mu\text{W}/\text{m}^2$ 12 feet from a Wi-Fi and $25,000 \mu\text{W}/\text{m}^2$ in the chair serving a computer.

¹Corpus Juris Secundum defines trespass in part as "...any misfeasance, transgression or offence that damages another's person, health, reputation, or property;" It is a "...wrong against the right of possession...any invasion of the interest in exclusive possession of property...an unauthorized entry on another's property." [Footnotes 6, 7, 8, 10, p. 711-712] There is, however, a distinction between a willful trespasser and an innocent trespasser, which illustrates the importance of educating the public of the nature and seriousness of spillover RFFRs. For example, one victim may be EMH and would be immediately and seriously harmed while other victims may simply lose sleep and not know the cause and suffer immediate cell or organ damage and have no immediate symptoms. Trespass is a very complex concept in law and the material I present here is obviously incomplete.

B. Legislative Proposal #1: Congress should critically review RFFR safety limits set by the FCC/NCRP and recommendations by IIBBE with a view to rejecting the former and accepting the latter to reduce human harm from radio frequency radiation fields.

The FCC/NCRP has set RFFR safety limits which are taken from the FCC, Office of Engineering & Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, OET Bulletin 65, Edition 97-01 (August 1997), Appendix A, Table 1. [58] This FCC safety standard was taken from the National Council on Radiation Protection and Measurements (NCRP), "...a non-profit corporation chartered by the U.S. Congress to develop information and recommendations concerning radiation protection." [58, p. 7] NCRP developed the standard from the Institute of Electrical and Electronics Engineers, and adopted by the American Standards Institute. The FCC also considered comments by the Environmental Protection Agency, Food and Drug Administration, and "...other federal health and safety agencies..." [58, p. 7-8]. The sole criteria used in judging harm to humans is the "averaged SAR." [58, p. 8] The SAR refers to the Specific Absorption Rate, a measure of heat absorption in watts per kilogram/gram (W/kg, mW/gm) [58, p. 5, 10]. Use of the SAR, a thermal measure, as a measure of harm to humans is disputed by many scientists. One research article stated "...the vast majority of the recorded biological effects from man-made non-ionizing environmental radiation are non-thermal." [64]

Thus, the FCC/NCRP radiation standards disregard all damage to human organs caused by radio frequency fields not measured by heat absorption, disregard the higher RFFR absorption rates by fetuses and children, and assume that SAR safety standards are correct, which is a false assumption.

The FCC/NCRP standards often seem to be associated with antennas with an implied association with human spatial fields; "human spatial fields" are RFFR that directly influence the space around a person. My recommendations in this report disregard antenna standards *per se* and set safety standards exclusively for the space around a human even though they are transmitted by an antenna.

IIBBE sets its safety standards from standards set by a committee of ten members of Institut für Baubiologie + Ökologie IBN (German) which are reviewed annually by IIBBE experts. These experts set the anomaly standards based upon harm they have perceived from their experience of harm to humans from heat and non-heat electromagnetic energy in their RFFR inspections and other sources. Further, substantially all RFFR inspectors use $\mu\text{W}/\text{m}^2$ not mW/cm^2 . Obviously, the RFFR industry prefers $1 \text{ mW}/\text{cm}^2$ to its equivalent, $10,000,000 \mu\text{W}/\text{m}^2$ because $1 \text{ mW}/\text{cm}^2$ is so much smaller than $10,000,000 \mu\text{W}/\text{m}^2$.

Since NCRP is a chartered corporation of the United States Congress,

it should be a simple and direct process of holding Congressional hearings to form opinions about RFFR safety limits and have NCRP conform to those set by IIBBE unless Congress finds clear evidence the IIBBE standards are too low. Since EPA has participated in acceptance of FCC/NCRF RFFR safety standards, it may be best for Congress to rely on an alternate RFFR-oversight/education/protection agency, medical authorities who have treated EMH-sensitive individuals, and others with RFFR symptoms and illnesses.

C. Legislative Proposal #2: Execute enabling legislation to create a new federal agency to have jurisdiction to fund research, set integrity standards governing research, provide public education of the potential harm to humans from RFFR, and warn the public of harmful power densities from RFFR-emitting equipment.

Since the preceding section has shown that FCC/NCRF, with the input of EPA, disregard all human injury other than that from heat using the SAR, has preposterously high safety limits, and disregards the higher RFFR absorption rates of children and fetuses, there is no federal agency that has oversight control over wireless equipment safety from radio frequency field radiation. In essence, the FCC/NCRP have accepted safety limits derived from other government and private entities in its primary mission of disseminating and allocating broadcasting band widths. There are indications that wireless 5G may expand the band widths from about 6GHz currently to 100 GHz and thereby increase greatly band width energy. This may require Environmental Impact Statements for cell phone base stations measured by increases in power densities for line-of-sight buildings.

I have provided substantial evidence that radio frequency field radiation is linked to at least 48 adverse health conditions and possibly to the decline in labor force productivity and increases in depression and suicide contemplation rates for college students. Thus, it is crucial that Congress empower a federal RFFR-oversight agency independent of any agency which has participated in the current FCC/NCRP safety standards. Since EPA has participated in the current FCC/NCRP standards, it is necessary to create a new agency. And this must be done immediately to assure the American people are protected from a potentially catastrophic health crisis.

D. Legislative Proposal #3: Require point-of-sale notices on all personal property (e.g., cell phones, Wi-Fi, cordless phones, automobiles) containing wireless transmission equipment indicating the near-field magnetic (A/m) and/or electrical fields (V/m), the far-field power densities ($\mu\text{W}/\text{m}^2$) at prescribed distances, and warning of dangers found from funded and non-funded research.

Presently, wireless equipment including cell phones, Wi-Fi, cordless phones, and automobiles are sold with no notice to consumers of the strength of the power density of the RFFR or warnings of harm. Since RFFR has both near- and far-field components, the strength of each should be shown on point-of-purchase materials. The near-field consists of an independent magnetic (MF) and electrical field (EF) beginning at the antenna and extending about three wave lengths or about three feet depending upon frequency. The far field begins when the MF and EF join after about three feet to form an integrated far-field RFFR.

The posted notice on automobiles should be on the MSRP sticker and may be reduced to only the far field to simplify reporting. Since cars are similar to a Faraday Cage, their internal RFFR may be more harmful particularly to fetuses and young children, if the windows are closed.

The principal objective of showing the near- and far-field antenna outputs is to begin an educational campaign to inform the public of these two measures of EMF/RFFR power. In the longer run with greater public knowledge, equipment may adapt to serve better the health needs of all Americans. It is essential that any standard for far-field power densities be in **micro Watts per square meter ($\mu\text{W}/\text{m}^2$)** because the numbers are large enough to have meaning and because $\mu\text{W}/\text{m}^2$ is used by EMF inspectors in the United States and Canada.

The notice could also provide a measure of IIBBE safety standards I show in Table 3.

E. Legislative Proposal #4: Require posted notice of power densities from radio frequencies in enclosed public spaces

containing Wi-Fi.

In order to educate the public about harmful power densities from RFFR emitting equipment, notices of power densities should be posted in all public enclosed spaces containing Wi-Fi including buildings, busses, trains, and aircraft. The posted power densities should be periodically updated.

For enclosed building space containing Wi-Fi, public notices of power densities should provide the power density at times of approximate peak occupancy, which would include RFFRs from endogenous Wi-Fi, spillover RFFRs from other space, customer and staff cell phones, and exogenous sources.

Busses and trains containing Wi-Fi should report the power density inside the bus/train with approximately peak occupancy and include Wi-Fi and cell phones. I measured one city bus at 12,500 $\mu\text{W}/\text{m}^2$ attributable to Wi-Fi excluding exogenous sources of RFFR (e.g., cell phone base stations) and cell phones inside the bus.

Aircraft containing Wi-Fi should report the power density inside the aircraft at approximately peak occupancy and include Wi-Fi and cell phones.

F. Legislative Proposal #5: Require medical doctors to report illnesses caused by RFFRs to the United States Department of Health and Human Services.

Presently, there is no knowledge of the percentage of EMH individuals or others who have symptoms (e.g., headaches, anxiety, unable to sleep) or illnesses (e.g., EMH, brain tumors) attributable to RFFRs. In order to evaluate the safety of the present system and on-coming wireless 5G, it is crucial to understand the medical conditions, if any, caused by wireless technology.

All doctors should report the names of individuals with illness with a high probability caused by RFFR to the U. S. Department of Health and Human Services. This should include those that have a high probability of being Electromagnetic Hypersensitive, having same side brain tumors, low sperm count, etc. where there is a high probability that RFFR emitting equipment is the cause. While I am aware that it may be difficult to assign a high probability of cause of a specific illness to RFFR, this must be done to have a measure of safety of RFFR-emitting devices. Reporting standards could be written by the oversight/education/protection agency with the input of the American Medical Association and other medical associations.

G. Legislative Proposal #6: Measure far-field RFFR in $\mu\text{W}/\text{m}^2$ (micro watts per square meter) not $\mu\text{W}/\text{cm}^2$ (micro watts per square centimeter).

It is important to measure far-field RFFR in $\mu\text{W}/\text{m}^2$ (micro watts per square meter) not $\mu\text{W}/\text{cm}^2$ (micro watts per square centimeter) because substantially all EMF/RFFR inspection personnel use $\mu\text{W}/\text{m}^2$, and (2) $\mu\text{W}/\text{cm}^2$ is a very small number that seems inherently safe and is favored by manufacturers and installers of wireless equipment for that reason.

H. Legislative Proposal #7: Establish a plan to accommodate EMH individuals

It is necessary for Congress to hold hearings to determine the problems faced by EMH sensitive individuals and from this evidence establish a plan to accommodate them with reduced RFFR geographical areas, special transportation accommodations, living spaces free of spill over RFFRs from Wi-Fi and cell phones, and other accommodations

VIII. Discussion

This article (1) provides a list of 48 adverse health conditions in humans and rats having a causal link to radio frequency field radiation (RFFR) supported by medical research, (2) supports my hypothesis that the decline in labor force productivity from about three percent to 0.5 percent from 2011 to 2016 and the increases in college student depression and contemplation of suicide rates may be caused by wireless communications, (3) suggests creation of a new federal oversight/education/protection agency to fund research to determine if there are causal linkages between wireless devices and adverse human conditions, and inform and protect the public from harmful power densities from wireless devices, (4) offers 11 research suggestions for the oversight/education/protection agency, and (5) offers seven U.S. Congressional legislative proposals to educate and protect the American people from the adverse health effects of uncontrolled and

unbounded expansions of wireless communications. The electromagnetic field scope of this article emphasizes principally radio frequency field radiation and secondarily magnetic fields from electrical current.

The 11 federally funded research issues I offer include the following:

1. Discussion of the institutional setting to create a new federal oversight/education/protection agency to fund research providing scientific evidence which asserts or denies a causal link between RFFR and adverse health conditions, and to educate and inform the American people of the potential harm from wireless communications.
2. Fund general research to develop scientific evidence which asserts or denies a causal link between RFFR and adverse health conditions.
3. Assert or deny a causal link between RFFR and reduction of melatonin.
4. Determine if adverse health conditions from RFFR are increased in enclosed spaces.
5. Determine if the lower power density standards set by IIBBE provide more reliable exposure limits than FCC/NCRP the latter of which are about 7,000 times or more greater than the former.
6. Determine if there is a medical link between delayed onset brain damage from concussions and delayed onset brain damage from RFFRs.
7. Determine if Wi-Fi damages plant seeds from growing.
8. Determine if RFFR interferes with the Schumann Resonance (SR) in combination with human brain radio frequency waves or interferes with human radio frequency brain waves separately and independent of the Schumann Resonance.
9. Determine if there is a natural cap of RFFR for each person based upon their body's functional relationships beyond which they become afflicted with electromagnetic hypersensitivity (EMH).
10. Do EMH individuals exhibit objective bodily changes when they are exposed to RFFR proving that EMH is a diagnosable illness?
11. Provide a reasonable accommodation model for those with EMH.

The seven legislative proposals I offer to assure the safety of the American people from wireless communications are:

1. Congressional review of RFFR power density safety standards through the National Council on Radiation Protection and Measurement, a non-profit corporation chartered by the United States Congress.
2. Pass enabling legislation to fund a new federal oversight/education/protection agency to fund research providing scientific evidence which asserts or denies a causal link between RFFR and adverse health conditions, and to educate and inform the American people of the potential harm from wireless communications.
3. Require point-of-sale notice of the strength of near field and power density of the far field for all personal property emitting RFFR, if it is shown that RFFR causes adverse health conditions.
4. Require posted notice of power densities from RFFR in any public enclosed space containing Wi-Fi, if it is shown that RFFR cause adverse health conditions.
5. Require medical doctors to report RFFR illnesses to the United States Department of Health and Human Services, if it is shown that RFFR cause adverse health conditions.
6. Require far-field RFFR to be measured in micro watts per square meter ($\mu\text{W}/\text{m}^2$), not milli Watts per square centimeter (mW/cm^2).
7. Establish a plan to accommodate EMH individuals.

The emphasis of these recommendations is to educate, inform, and protect the American people from the adverse health conditions from RFFRs supported by RFFR agency research, if, in fact, scientific evidence shows that RFFR causes significant adverse health conditions.

I have no conflict of interest related to the material in this article.

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