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RADIO FREQUENCY RADIATION DEVICES AND ANTENNAS MAY VIOLATE THE RIGHT TO LIFE PRINCIPLE

Healthcare

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ABSTRACT

This article proposes that the Right to Life Principle, defined as "every person has the right to a natural birth and legitimate survival and development into adulthood without environmental or other systematic injury to their well-being," may be violated by RFR emissions from cell phones, Wi-Fi, macro cell phone base stations (MCPBSs), 5G/4G small cell antennas (SCAs), etc. in excess of the standards set by the Building Biology Institute. BBI standards set 1000 μW/m2 as an extreme anomaly; the precise division point of harm/no harm below 1000 μW/m2 is unknown.

I review literature describing (1) the Right to Life Principle, (2) the attributes of non-ionizing radiation, and (3) proven injury from cell phones, Wi-Fi, MCPBSs, 5G/4G SCAs, etc. to living organisms with 20 categories of illnesses and 58 references. Non-ionizing radiation is shown to place a force field on negatively charged particles including electrons, neurons, and DNA, and exciting/energizing electrons with shifts to outer orbits with energy emission when they return to ground orbit thereby destabilizing atoms, molecules, cells and organs in the process of orbital shifts. RFR induced illnesses include sperm damage, fetus injury, irreversibility infertility, emotional and hyperactive disorders, cancer, damage to DNA, the immune system, blood brain barrier, and stem cells, increases in oxidative stress and free radicals, and harm to those living less than 500 meters from MCPBSs. My recommendations to reduce injury from RFR are based upon review of the literature, experience in metering residential property and MCPBSs for RFR, avoiding the use of RFR emitting devices and access to line-of-sight antennas, and legislative proposals to show the dangers of RFR devices and antennas by, for example, requiring notice to buyers and lessees of residential property of power densities within housing units.

KEYWORDS

RF radiation electron excitation, Macro cell phone base stations harm, Sommerfeld-Brillouin Precursors, RF radiation oxidative stress, RF radiation right to life, RF radiation reproductive harm

I. INTRODUCTION

This paper is intended to support the principle that anyone using wireless communications (*e.g.*, cell phones, Wi-Fi) or coming in contact with emissions from MCPBSs or 5G/4G SCAs in their daily life may be violating the Right to Life Principle because scientific evidence provided herein shows RFR harms natural birth, survival, and development. We provide the definition and scope of the Right to Life Principle, discuss the attributes of RFR non-ionizing radiation on negatively charged particles, neurons, electrons, molecules, and organs, describe electron orbital shifts from non-ionizing radiation, provide evidence from published research that wireless communications harm living organisms thereby violating the Right to Life Principle, describe the huge variance in international standards for safe RFR antenna emissions, recommend methods to reduce exposure to RFR emitting devices, and propose legislation to educate people about the electronic smog that is damaging our environment and humanity.

II. Scope and definition of the Right to Life Principle

We begin a discussion of the scope of Right to Life Principle with the rights of a child because that is the beginning of the life cycle:

1."…parties recognize that every child has the inherent right to life."
2."…parties shall ensure to the maximum extent possible the survival and development of the child."

This means reduction of infant mortality, increase in life expectancy, combating disease, providing nutritious food, clean drinking water, refraining from any action that may intentionally take life away, and to safeguard life. Because of their immaturity, children need special safeguards and care including legal protection before and after birth. [1] Survival and development mean living in a healthy environment that does not systematically destabilize and injure charged particles, neurons, electrons as they roll-up into organs, and/or the being of the child as he or she grows into adulthood.

Convention principles are supported by religious organizations. Most Holy Father Pope Paul VI stated:

"We are obliged once more to declare that the direct interruption of the generative process already begun and above all, all direct abortion, even for therapeutic reasons, are to be absolutely excluded as a lawful means of regulating the number of children." [2]

"All life is sacred, at all points in time, and at all points in human development, from conception to natural death." [3] Evangelicals began to oppose abortion in about 1978 with (1) the founding of the Moral Majority, (2) Concerned Women of America, (3) publication of the book, "Whatever Happened to the Human Race" by Francis Schaefer and C. Everett Koop and its companion film series, and (4) election of a conservative by the Southern Baptist Convention. [4]

This paper defines the Right to Life Principle (RTLP) as:

"Every person has the right to a natural birth and legitimate survival and development into adulthood without environmental or other systematic injury to their well-being."

While many in the United States (and worldwide) may support the woman's right to choose under *Roe vs. Wade*, 410 US 113 (1973), all of us have the duty to support legitimate survival and development. The purpose of this article is to provide evidence that a child's right to life and legitimate survival and development as they evolve from a fetus into adulthood are physically injured by environmental exposure to RFR from cell phones, Wi-Fi, MCPBSs, 5G/4G SCAs, and other RFR emitters at power densities at least as low as 1,000 $\mu W/m^2$ peak. I have measured one MCPBS, about 200 feet from a residential building, emitting 200,000 $\mu W/m^2$ peak PD within 70 feet of the building, several MCPBSs emitting between 50,000 to 70,000 $\mu W/m^2$ peak power density (PD) within 100 feet of residential housing, and 125,000 $\mu W/m^2$ peak PD in an office within 100 feet of a MCPBS.

Author Note

Herman Kelting has degrees in industrial engineering/engineering economics from Stanford University, an MBA from Northwestern University, and a PhD in real estate and urban land economics from the University of Wisconsin Madison. He has ten years of college teaching and 30 years performing financial analyses and business valuations for a US federal agency from which he retired. His research relating radio frequency radiation (RFR) to adverse health conditions has resulted in one article, about a dozen research letters to elected and appointed state and federal officials, appearances opposing 5G/4G small antennas before the New Hampshire Commission to Study the Environmental and Health Effects of Evolving 5G Technology and Costa Mesa CA City Council, and RFR material in *Six Pillar Tips for Health Management* (Author House, Sept 2019).

I have no known conflict of interest to disclose.

This study continues certain ideas from Herman Kelting "United States Congressional Research and Legislative Proposals to Educate the American People About the Power Density Safety of Wireless Communication ($\mu W/m^2$)." *Indian Journal of Applied Research,* 8(1) (Jan 2018): 263-271. Abbreviations with explanations are provided in Section IX.

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III. The attributes of non-ionizing radiation on charged particles, neurons, electrons, atoms, molecules, and organs.

Non-ionizing RFR emitted by antennas consists of pulsed, modulated (information added), independent electric (EFs) and magnetic fields (MFs) in the near field, and EFs and MFs joined at right angles as RFR at about three wave lengths in the far field. The emissions include a low frequency information wave at about 200-300 cycles per second superimposed on a high frequency carrier wave (e.g., 2.0 GHz). EFs are more powerful than MFs. RFR may be viewed as consisting of massless, energized photons with both particle and wave attributes; the photons have increased energy with increased frequency. Radio frequencies range from 20 kHz to 300 GHz. [5]

In the presence of human bodies, RFR:

(1) Creates a force field on negatively charged particles such as free electrons, neurons, and DNA. The source force (*e.g.*, cell phone, Wi-Fi, MCPBS) causes the force-receiving charged particles to move and to be physically affected by the originating source emitter. [6]

(2) Excites neurons. In the case of six firemen with MCPBSs on the roofs of their fire stations, their symptoms included "…headaches, extreme fatigue, sleep disruption, anesthesia- like sleep where the men woke up for 911 calls 'as if they were drugged,' inability to sleep, depression, anxiety, unexplained anger, getting lost on 911 calls in the town they grew up in, a twenty (20) year medic forgetting basic CPR in the midst of resuscitating a coronary victim, immune-suppression manifest in frequent colds and flu-like symptoms." (2/5) Brain scans showed brain abnormalities and "…a pervasive, hyper-excitability of the neurons which suggested the exposure to RF (microwave) radiation was causing the neurons to continually fire, without rest. RF radiation appeared to act as a constant stimulant even when the men were away from the station, and in repose. The SPECT scans were considered abnormal in all 6 firefighters…In all six (6) firefighters, impairment was found with cognitive function, reaction time and impulse control." (3/5) [7]

(3) Excites electrons and, with non-ionizing RFR energy less than 10 electron volts, forces an outer-ring electron into a higher orbit. Highly modulated pulses and higher power densities may be more effective in sending an electron to a higher orbit, in contrast to ionizing radiation which removes completely an electron from the atom or molecule creating positive ions. With reduction or removal of the energy source, the unstable electron, which destabilizes the atom, molecule, and organ of which it is a part, returns to the ground orbit (lowest possible energy level) and releases proton energy in the form of "…fluorescent radiation or low-level x-rays." [8] Notably, electrons obey the Bohr atom rule (1913) and cannot exist between two energy radii, rings, or orbits—they must exist in preordained orbits.

Lending support to electrons absorbing photon energy from RFR causing the excitement of electrons to higher energy orbits, other authors have said:

- "Electromagnetic radiation [including radio waves] deposits energy in two forms as it passes through biologic material: excitation and ionization. Excitation describes the deposition of enough energy to raise an electron to a higher electron shell without ejection of the electron." [9]
- "Many of the electrons can absorb additional energy from external sources of electromagnetic radiation (see Figure 3), which results in their promotion to an inherently unstable higher energy level." [10]
- "…non-ionizing radiation has sufficient energy only for excitation, the movement of an electron to a higher energy state." [11]

The destabilization of atoms from non-ionizing RFR placing a force on charged particles in the human body, exciting electrons to change orbital rings and release x-ray energy when the electron returns to its ground state may be a partial or full explanation for anxiety, depression, and stress causing the increases in college and high school students requesting special exam environments, dramatic increases in the 10-14-year age group suicides starting in 2008, DNA single and double strand breaks, and other illnesses and symptoms I describe elsewhere in this paper.

IV. Introductory medical and other inferential evidence of harm to humans from RFR

My research of the medical and current event literature, prior to research for this paper, has found evidence directly or inferentially linking RFR with harm to living organisms.

- In IJAR 2018, I provided medical research linking 28 adverse changes in cells, symptoms, and illnesses to RFR. These included ADHD, cancer of the brain, salivary gland, and breasts; leukemia, anxiety, depression, sleep disturbances, stress, reduction in melatonin, cataracts, increases in inflammation; damage to the testes, sperm, blood brain barrier, DNA, eyes, heart, thyroid hormones, etc. [12] My on-going review of IJAR 2018 and other research suggested that I add additional references for each injury to increase the reliability of the causal relationship between RFR and specific injuries.
- The percentage of college students who "felt so depressed that it was difficult to function at any time during the last 12 months" increased from 29.5% in Fall 2012 to 39.3% in Fall 2017, an average increase of about 2% per year. [13]
- The percentage of college students who "seriously considered suicide" increased an average of 0.5% annually from 2008 to 2016 and 1.7% in 2017 for a total of 12.1% in 2017. [14]
- Suicide rates in the United States increased dramatically for the 10-14-year age group starting in 2008 compared with the preceding ten years when it was declining. Suicides for the 10-14-year age group declined from 242 in 1999 to 180 in 2007, a decline of 2.9% per year, then increased to 596 in 2018, an annual increase of 11.5%. [15] In my opinion, this increase was principally attributable to age group 10-14 exposure to cell phones and other wireless communications often beginning as fetuses. It is known that Jenny Fry, a UK teenager, committed suicide because of Wi-Fi in her high school. One medical practitioner told me "Doctors know that cell phones cause suicide."
- Up to 25% of college students are claiming mental disabilities from anxiety, stress, and depression to take longer course testing times and private testing rooms. At Pomona College, students claiming mental disabilities increased from 5% in 2014 to 22% in 2018. [16]
- Up to 20% of high school students in upper income high schools are claiming 504 accommodations because of mental disabilities from anxiety and ADHD to take longer testing times for classroom, SAT, and ACT tests. [17] The probable cause is because RFR is a stimulant like caffeine and a known cause of ADHD.

I reported this information to the secretaries of Health and Human Services (HHS) and Homeland Security in a letter dated October 3, 2018 stating: "This data indicates the possibility of a catastrophic health crisis is upon us that will damage our labor force and economy for years to come." The Secretary of HHS immediately reported it to the National Institute of Health (NIH), and NIH rejected investigation three days later on about October 9, 2018. I am continuing to follow up on my charges of a catastrophic health crisis caused by RFR.

V. Power density safety standards

A. INTRODUCTION

Power density standards are set by individual countries and worldwide groups of knowledgeable individuals. The latter includes the Building Biology Institute of which I am a member and the Federal Communications Commission in the United States.

B. Building Biology Institute (BBI)

The Building Biology Institute sets the following RFR peak safety standards based upon the opinion of ten RFR experts from their professional experience. [18]

BBI peak power density standards

bbi peak powder density standards				
RFR in $\mu W/m^2$ peak	no Concern	slight Concern	serve Concern	extreme Concern
	0.1	0.1-10	10-1,000	1,000

C. U.S. Federal Communications Commission (FCC)

The Federal Communications Commission sets an average antenna power density safety standard as shown below. This standard is taken from the National Council on Radiation Protection and the American National Standards Institute for 100 MHz to 1,500 MHz.[19]

Maximum Permissible Exposure for the General Population: Uncontrolled Exposure: Frequency and Power Density

Frequency	FCC power density		Averaging Time
F=MHZ	mW/cm^2	$\mu W/m^2$	
30-300	0.2	2,000,000	30 minutes
300-1500 F/1500			30 minutes
1500-100,000	1.0	10,000,000	30 minutes

Most cell phone frequencies are 824-894 MHz and 1850-1990 MHz and Wi-Fi frequencies ranges are about 900 MHZ, 2.4 GHz, 3.6 GHz, 4.9 GHz, 5.9 GHz and 60 Ghz.

Commenting on the FCC standards in 2014, the Office of the Secretary of the 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." [20]

D. International Power Density Safety Standards

International standards for power density safety limits vary considerably based upon countries and by antennas and emitting devices. For example, the US has safe exposure limits of up to 10,000,000 $\mu W/m^2$, Australia 2,000,000 $\mu W/m2$, New Zealand 500,000 $\mu W/m^2$, Luxemburg 240,000 $\mu W/m^2$, Switzerland 95,000 $\mu W/m^2$, Russia 20,000 $\mu W/m^2$, and New South Wales, Australia 10 $\mu W/m^2$. [21] Given the vast range of national safe power densities, it is apparent that no country knows the correct RFF safe standard. Notably, India reduced their standards by 90% on 01.09.2012 (*e.g.*, for 2100 MHz from 10.5 W/m^2 to 1.05 W/m^2).

VI. Research evidence of harm to living organisms from RFR

A. An overview of the relationship of the Right to Life Principle and illnesses caused by RFR

In order to show how the Right to Life Principle is violated by RFR antennas and body proximate devices, this section furnishes 20 categories of injury, 58 published research documents, and testimony from a 13-year-old child describing her and her sister's injuries from a 5G/4G Small Cell Antenna (SCA) about which they are powerless to turn off.

The life cycle data begins with sperm damage, injury from RFR to a fetus, examples of irreversibility infertility, emotional and hyperactive disorders, cancer, damage to DNA, the immune system, blood brain barrier, and stem cells, increases in oxidative stress and free radicals, and harm to those living less than 500 meters from MCPBSs. Wi-Fi has been found to cause degenerative damage to the testes, DNA, and reduced sperm count. Evidence shows that electromagnetic hypersensitivity is a well-defined pathological, neurologic disorder, and 5G/4G small cell antennas are linked with oxidative stress and inflammatory and metabolic processes. And the cause of this harm may be from non-ionizing radiation exciting electrons to shift orbits and release X-ray energy when they return, and place RFR force on negatively charged electrons, neurons, and DNA to cause physical dislocations from their equilibrium positions.

B. Reproductive harm from RFR

- A study of 361 men (average age 31.8 ±6.1 years) in a fertility clinic reported reduced sperm count, motility, (moving property 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/day, 2-4 hours daily, and >4 hours daily usage. For example, the sperm count declined from 85.89 for no use of cell phone to 50.30 for over four hours per day (41.4% decline), and % normal morphology declined from 40.32 to 18.40 (54.4% decline).[22]
- Sperm samples were taken from 29 men with a mean age of 34 ± 5.6 years and exposed to four hours to a 2.4 GHz Wi-Fi from an active laptop accessing the Internet. The radiation from the computer was three or four times higher than without Wi-Fi and 7-15 times higher than the absence of a laptop. It was found that there was a significant decrease in progressive sperm motility (68.7% ±8.8% vs. 80.9% ± 7.5%), a significantly higher proportion of sperm with DNA fragmentation (8.3%±6.6% exposed *vs.* 3.3%± 6.0% not exposed), and a significant increase in immotile sperm (24.5% ± 7.6% vs. 13.6 ± 5.6%; cannot travel up the virginal tract or into the uterus). [23]
- Six Wistar rats were exposed to one hour of a GSM 0.9/1.8 GHz mobile phone daily for 28 days (which probably understates typical human exposure to cell phones currently). It was discovered that the exposed rats exhibited a significantly reduced percentage of motile sperm (71.97% ± 8.7% controls vs. 43.08% ±10.03% for exposed, a 40.1% reduction), a significant increase in lipid peroxidation (a measure of harmful oxidative stress; 8% increase in testis and 12% increase in epididymis), and reduced glutathione (GSH) content in the testis (10% reduction) and epididymis (24% reduction). [24]
- In a study of rat testes response to exposure to Wi-Fi at 2.437 GHz 24 hours per day for 20 weeks, it was found that tissue markers indicated "DNA damage" and "decreased levels of catalase [enzyme that catalyzes reduction of H_2O_2] and glutathione peroxidase activity due to exposure." (p. 223) These results indicate potential harm to growing organisms of reproductive age with a potential effect on fertility and integrity of germ cells. [25]

C. Species extinction from RFR

- In a Greek study of the reproduction of rodent births in response to an average power density of between 168 nW/cm^2 (1,680 $\mu W/m^2$) and 1053 nW/cm^2 (10,530 $\mu W/m^2$) from an antenna park, it was found that "A progressive decrease in the number of newborns per dam was observed, which ended in irreversible infertility." (p. 455) [26]
- Experiment showed that the reproductive capacity of the insect Drosophila melanogaster declined 36.4% (1 min), 42.5% (6 min), 49.2% (11 min), 56.1% (16 min), and 63.0% (21 minutes exposure to a GSM 900 and 1800 MHz carrier frequency and 217 Hz information frequency with exposure at a power density of 100,000 $\mu W/m^2$ (10 $\mu W/cm^2$) 8 to 12 inches from the antenna. The authors concluded that "…short term exposure to these radiations have cumulative effects on living organisms." (p. 17) [27]
- The productivity of hatched eggs from white stork nests in Valladolid, Spain within 200 meters of a cell phone base station was 0.86 ± 0.16 chicks vs. twice that amount, 1.6 ± 0.14 chicks, for nests more than 300 meters from the phone masts. Twelve (12) nests (40%) less than 200 meters from the masts hatched no chicks vs. only one (3.3%) hatching no chicks at distances greater than 300 meters. The electric field intensity was 2.36 ± 0.82 V/m within 200 m (PD = 2.36 V/m x 10,000/1.94 V/m = 12,164 $\mu W/m^2$) and 0.53 ± 0.82 V/m more than 300 m. [28]

C. Dose dependent changes in pregnant women's cord blood from RFR

- The umbilical cord blood of 149 pregnant women who had exposure of 2-15, 15-60, and over 60 minutes per day during pregnancy had significant dose dependent increases in AST and ALT; the highest level of CK, CK-MB, TnT, and LDH were found in women with over 60 minutes per day of cell phone use. These results indicated that infants of the most RF exposed group have a potential to be candidates of cardiovascular disease. The authors concluded that women should avoid long-term mobile phone exposure during pregnancy. [29]

D. Children: Behavioral, memory, task learning problems from RFR

- When 13,159 children, who had both prenatal and postnatal exposure to cell phones in Denmark, reached the age of seven by November 2006, their mothers responded to a survey regarding behavioral problems. It was found that children who had both prenatal and postnatal exposure to cell phones had an odds ratio of 1.80 (95% CI) of behavioral (emotional and hyperactive) problems. [30]
- Three hundred seventeen (317) 7th grade students from public and private high schools took two tests measuring speed and accuracy requiring strong mnemonic and attentional information processing. The weekly medium number of voice calls and text messages were 8 each. Those reporting the most cell phone calls had shorter response times but significantly less accuracy and took longer to complete Form B. Students who had more text messages had shorter response times but less accurate responses to working memory and associated learning tasks. [31]

E. Immune system damage by RFR

- "EMFs disturb immune function through stimulation of various allergic and inflammatory responses, as well as effects on tissue repair processes. Such disturbances increase the risks for various diseases, including cancer. These and the EMF effects on other biological processes (*e.g.*, DNA damage, neurological effects, etc.) are now widely reported to occur at exposure levels significantly below most current national and international safety limits." (157) [32]
- "Certain premises exist which indicate that, in general, short-term exposure to weak MW radiation may temporarily stimulate certain

humoral or cellular immune functions, while prolonged irradiation inhibits the same functions." (p. 393) [33]

- Exposure of wall lizards 24 h/day for eight weeks to an 1800-1900 MHz DECT base transmitter emitting 3.2 V/m (PD=3.2x10,000/1.94=16,494 $\mu W/m^2$) resulted in a 45% suppression of immunocompetence inflammatory responses. [34]
- RFR from a mobile phone (1800 MHz) with a power density of 1,000,000 $\mu W/m^2$ (0.1mW/cm^2) was applied to leukocytes (white blood cells combating foreign substances) within five (5) cm of the microscopic stage for ±15 minutes of experiment beginning time. There were significant changes in leukocytes movement direction and behavior including changing shape much faster, shrinking, expanding, and rolling. Leukocytes movement speeds rise by about 50% above the speeds at the same temperature without the RF, and their cell velocity approximately doubled from 3.45 ±1.12 μ/min (mean, stddev) to 6.40 ± 0.90 μ/min with exposure to RFR. It took an average time of 2.7 minutes of exposure for damage to begin and the RFR caused damage to the leukocytes cells and the cells expanded and lost their ability to move. [35]
- Nineteen women with at least two years exposure to radio television broadcasting stations with a mean Electric Field of 4.3 ± 1.4 V/m experienced a significant reduction in Natural Killer cells and, thereby, had reduced cytotoxic activity of the immune system. [36]
- A MCPBS installed in a small Bavaria town in 2004 resulted in dose-dependent, significant adverse effects on the adrenergic system (regulates cardiovascular system) measured by significant decreases in dopamine and phenylethylamine for 60 participants over 1.5 years. The peak values averaged 76.9 $\mu W/m^2$. The article concluded: "Chronic dysregulation of the catecholamine system (i.e., adrenaline, dopamine; neurotransmitters) has great relevance for health and is well known to damage human health in the long run." (p. 44) [37]

F. DNA strand breaks

- Cultured human diploid fibroblasts and cultured rat granulosa cell were exposed to intermittent and continuous RFR used in mobile phones (1800 MHz and 1.2 and 2W/kg) with two different modulations for 4,16, and 24 hour periods with (1) intermittent 5 minute on/10 minute off or (2) continuous periods and 4.61 ms transmission length. Study showed that intermittent bursts do more damage than continuous emissions measured by DNA single and double strand breaks for the 16- and 24-hour exposure periods. The authors concluded that RFR induced DNA single-strand and double strand breaks in human diploid fibroblasts and in rat granulosa cells in culture. [38]
- A study of single strand DNA (carries genetic code for all living organisms) breaks in human hair root cells was performed on eight individuals holding a cell phone on the right ear and talking on a 900 MHz cell phone (SAR = 0.974 W/kg) for 15 minutes and 30 minutes separated by two weeks. The results showed that DNA single strand breaks significantly increased during the 15-minute period and increased even more for 30 minutes. Thus, the DNA damage was dose dependent, and supported by other referenced studies. [39]

G. Blood brain barrier permeability increased by RFR

- Forty-eight (48) rats were exposed to a GSM 900 MHz cell phone for two total hours at SARs of 0 mW/kg, 0.12 mW/kg, 1.2 mW/kg, 12 mW/kg, and 120 mW/kg; the US FCC safety standard is 1.6 W/kg. Thus, all exposures were well within the US FCC safety standard. The rats were sacrificed after seven days to determine albumin (protein intended to stay in the blood stream so it does not leak into surrounding tissues) extravasation (leakage of fluid from its container into surrounding area) as a measure of permeability of the blood brain barrier. The study revealed there were "…statistically significant differences for SAR of 12 mW/kg (Mann-Whitney, p=0.007) whereas a trend of increased albumin extravasation could be seen for 0.12 mW.kg (Mann Whitney, p=0.1) and 120 mW/kg (Mann-Whitney , p=0.1)." (9/17) The blood brain barrier "…protects the mammalian brain from potentially harmful compounds in the blood." (p. 2/17) These results showed that RFR disrupts the permeability of the blood-brain barrier. [40]

H. Brain changes from RFR

- Fifteen men received both real and sham exposure to a 902.4 MHz carrier wave cell phone signal modulated at an informational signal of 217 Hz for 45 minutes. with a maximum SAR of 0.5 W/kg on the left side of the head. It was shown that intracortical excitability (measures of potential brain disturbances) was significantly modified, short intracortical inhibition was reduced, and facilitation was enhanced in an acutely modified, exposed human cerebral hemisphere compared with the sham; CP emissions led to excitability of motor cortex (brain physiology) adjacent to the cell phone on the left side of the head. While these changes were transient in the sense the baseline conditions were partially regained one hour later, it is unknown what will happen after continuous day-to-day cell phone use. Several authors have suggested abnormal cortical excitability may lead to increases in cerebral blood flow, changers in oxidative status, heat shock proteins, cell apoptosis, receptor activity, and neuron hyperexcitability leading to neurological diseases. [41]
- Twelve men were exposed twice about one week apart to RFR emissions from a pulse modulated 900 MHz handset for 30 minutes on the left side and scans were taken of the brain starting ten minutes after the end of the 30 minutes. It was discovered that regional cerebral blood flow (rCBF) was increased on the left side of the brain (left dorsolateral PFC) that was not caused by SAR heat. The effect was dose dependent upon the spectral power in the amplitude modulation of the RF carrier associated with stronger low frequency information signals. [42]

I. Oxidative stress and free radicals increased by RFR

- The authors conducted a study of 12 adult males, who kept their 900 MHz cell phone in standby in their pants pocket with the keypad facing the body. After exposure for 1, 2, and 4 hours, it was found that plasma lipid peroxides increased significantly in all three of the time periods, SOD activity (defends against ROS) decreased significantly in two of the three time periods, and GSH-Px significantly declined in two of the three time periods. These results show that RFR from cell phones increase oxidative stress, free radicals, and peroxidation, and decrease SOD and GSH-Px thereby damaging DNA, RNA, and proteins that may cause cell death. [43]
- Primary cultured cortical neurons (cells transporting nerve impulses) were exposed to pulsed 1800 MHz modulated by a 217 Hz information RFR at an SAR of 2 W/kg for 24 hours. It was discovered (1) there was a significant increase in 8-OHdG, a biomarker of DNA oxidative damage in the mitochondria of neurons, and (2) there were reductions in the copy number of mitochondrial DNA (chromosome inside mtDNA and power house of the cell; "mtDNA") and levels of mitochondrial RNA (encodes RNA and 13 proteins). The oxidative damage to mtDNA may account for the neurotoxicity of RFR radiation in the brain. [44]
- Study using RFR generated by a GSM 1.8 GHz (5 min on and 10 min off for 6, 12, and 24 hours never exceeding 0.1 degrees C in any of the experiments) indicated a statistically significant increase in oxidative stress (excess in oxidants over anti-oxidants that contributes to atherosclerosis, cardiovascular diseases, neurodegenerative disorders, and cancer) measured by a significant increase in reactive oxygen species, lower cellular viability, higher MDA (one of the most studied markers of oxidative stress) levels, and lower mRNA (carry genetic code to make proteins) levels. [45]

J. Cancer, trigger for from RFR

- In a series of three studies cumulating in this article, the authors exposed mesenchymal stem cells (MSCs are the stem cells in bone marrow that repair cartilage, bone, and BM fat; stem cells are the cells from which all other cells with specialized structure are generated) to GSM 905 and 915 MHz and UMTS 1947.4 MHz cell phone radiation. It was discovered "Microwaves from mobile phones inhibited formation of 53BP1 foci in human primary fibroblasts and mesenchymal stem cells….Contrary to fibroblasts, stem cells did not adapt to chronic exposure during 2 weeks." (p. 394) They also stated: **"Higher biological significance of MW effects in stem cells and apparently wider range of effective frequencies suggests that stem cells are the most relevant cellular model for assessment of health risks from mobile communication."** (8/10). It was indicated that chromosomal damage to MSCs may explain the origin of tumors and leukemia especially in children. [46]
- A review of 93 of 100 studies indicated that low intensity RFR far below thermal effects in biological tissues and far below safety limits of the International Commission on Non-Ionizing Radiation Protection revealed activation of pathways generating reactive oxygen species, peroxidation oxidative damage of DNA, and changes in the activity of antioxidant enzymes causing cancer and

non-cancer pathologies. The authors concluded "…RFR is an expressive oxidative agent for living cells with a high pathogenic potential and that the oxidative stress induced by RFR exposure should be recognized as one of the primary mechanisms of the biological activity of this kind of radiation." (p. 186) [47]

- Mobile phone male users (300) were separated into the age group of 20-30 and high-user (more than 5 years and more than 10 hours per week, and low-user groups (less than 5 years and less than 3 hours per week). It was discovered that the mean micronucleus cell count (cell component and marker for genotoxic damage) was significantly increased in the high CP user group (1.52 ± 1.176 vs. 0.77 ± 0.815). [48]

K. Macro Cell Phone Base Stations (MCPBSs) cause harm to humans

- In a review of the literature, the authors discovered 8 of 10 studies found "…increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances < 500 meters from base stations." (263) None of the studies' exposure were greater than accepted international guidelines. [49]
- A health survey was carried out in January 2001 in La Nora, Spain of two groups of 101 individuals living near an 1800 MHz MCPBS. The high exposure group of residents with (average bedroom power density of 1,100 $\mu W/m^2$; estimated average peak of 11,000 $\mu W/m^2$) lived within less than 150 meters of the MCPBS and the low exposure group (average bedroom power density of 100 $\mu W/m^2$; estimated average peak of 1,000 $\mu W/m^2$) lived more than 250 meters from a MCPBS. The correlation between the reported symptoms and the exposure intensity measured by the log of the electric field was 0.544 for discomfort, 0.515 for irritability, 0.485 for appetite loss, 0.438 fatigue, 0.413 headache, difficulty concentrating 0.469, and 0.413 sleep disturbances. [50]
- It was discovered that the median power density at the Stockholm Central Railway Station in Sweden for total exposure was 921 $\mu W/m^2$, and the mean total RF radiation varied between 2,817 to 4,891 $\mu W/m^2$ for each of seven walking runs; based upon the estimated average to peak ratio of 1:10, the peaks varied from 28,170 to 48,910 $\mu W/m^2$. A peak of over 95,544 $\mu W/m^2$ was recorded near a MCPBS in the station, which was beyond the detection range of the meter, and other peaks for individual bands were 41,281, 58,843, 59,847, and 40,158 $\mu W/m^2$ (Table III). [51]
- In Belo Horizonte, Brazil, it was found that deaths from neoplasia (*i.e.*, abnormal growth of tissue; cancer) increased with close proximity to cell phone base stations. The relative distance related risks for mortality rates for death by neoplasia (abnormal mass of tissue) were as follows:

Meters	100	200	300	400	500	600	700	800	900	1000
Relative risk	1.35	1.25	1.15	1.11	1.08	1.05	1.05	1.04	1.03	1.00

Power densities varied from 8,980 uW/m^2 (0.898 $\mu W/cm^2$) to 30,660 $\mu W/m^2$ (3.066 uW/cm^2) in 2003. Brazilian power density standards were 4,513,400 $\mu W/m^2$ (451.34 $\mu W/cm^2$) at 900 MHz and 9,024,900 $\mu W/m^2$ (902.49 $\mu W/cm^2$) at 1800 MHZ. [52]

- In a study of tree damage in Germany, it was discovered that cell phone base stations damaged the sides of 60 trees facing the CPBS. Power densities varied from 6 to 17,060 $\mu W/m^2$; the median peak hold power density from the MCPBS on the damaged side was 995 $\mu W/m^2$ and on the undamaged side was 125 $\mu W/m^2$. A power density of 995 $\mu W/m^2$ is obviously far less than the FCC safe threshold of 6,000,000 to 10,000,000 $\mu W/m^2$ average and equal to a peak extreme anomaly of 1,000 $\mu W/m^2$ specified by the Building Biology Institute.

The authors quote from M. Repacholi, head of the International EMF Project of the WHO (p. 567), who said in part:

"Given that any adverse impact on the environment will ultimately affect human life, it is difficult to understand why more work has not been done…research should focus on the long-term, low level EMF exposure for which almost no information is available." (p. 567) [53]

- In an Israel study of cancer rates near a cell phone base station, it was discovered that 3-7 years' exposure times had cancer rates 4.15 times the cancer rate in the entire population and that the cancer rate for women was 10.5 vs. 1.0 for the whole town of Netanya. The power densities were far below current guidelines of 5,300 uW/m^2 (0.53 uW/cm^2) for thermal effects.[54]
- In an Egyptian study of perceived symptoms by 85 residents living in a building with a cell phone base station with three antennas, it was indicated there were statistically significant differences in percentage symptoms for headaches (23.5%/10%), memory changes (28.2%/5%), dizziness (18.8%/5%), tremors (9.4%/0%), depressive symptoms (21.7%/8.8%), and sleep disturbances (23.5%/10%) compared with controls. Exposed residents performed more poorly in one test of attention, one test of short-term auditory memory, one test of problem solving, one neurobehavioral test, and superior in three others. Antenna01 had power densities of 20,000 to 63,000 $\mu W/m^2$ Antenna02 had power densities of 24,000 to 67,000 $\mu W/m^2$, and Antenna03 had power densities of 27,000 to 55,000 $\mu W/m^2$. The Egyptian safety standard for continuous exposure to RFFR was 80,000 $\mu W/m2$. One apartment below Antenna01 had an internal power density of 1,000 $\mu W/m^2$. [55]
- In a German study of 1000 patients living within 400 meters of a cell phone base station for 10 years, it was discovered that for the period 1999 to 2004 the risk of getting cancer tripled and the cancer developed 20 years earlier. The relative risk of getting breast cancer for those living within 400 meters of the tower increased to 3.4. The radiation within 400 meters was 100 times the radiation beyond 400 meters. [56]
- A study of 530 people living in France discovered distance/dose influence of illnesses perceived by those living within 300 meters of a MCPBS. These microwaves had a carrier frequency of 900 or 1800 MHz and an information MW of under 300Hz. The authors recommended that MCPBSs be sited at least 300 meters from populations.

The distance distribution of people and their symptoms were:

Distance to Percent Illnesses reported significantly more often

Antenna		(p<0.05)
<10m	19.6%	Nausea, loss of appetite, visual disturbances, difficulty in moving.
Upto100m	40.0%	Irritability, depression, concentration, dizziness, difficulties, loss of memory, lower libido.
100-200m	9.6%	Headaches, sleep disruption, discomfort, skin problems.
200-300 m	10.1%	Fatigue
>300 m	20.7%	Reference group
Total	100%	

[57]

- A study was conducted from 2007-2009 in India of 91 individuals 63 of which were living within 50-300 meters of a 900-2200 MHz bandwidth MCPBS and 28 controls not influenced by a MCPBS) erected on the roof top of a residence with the MCPBS owners living on the ground floor. Power densities ranged from 10,410,000 to 12,210,000 $\mu W/m^2$. The results showed significantly increased genetic damage measured by damage frequency elevated 2.5 times, damage index elevated 3.5 times, and the mean DNA migration length (movement of the negatively charged DNA toward a positive anode) elevated by 4.5 times vs. the control group not affected by a nearby MCPBS. Safety limits at the time of study were 4,500,000 $\mu W/m^2$ for 900 MHz and 9,200,000 $\mu W/m^2$ for 1800 MHz which were lowered to 10% of those values in September 2012. [58]
- A survey was returned by 394 individuals reporting injuries from MCPBSs and body proximate devices in Switzerland from June 2001 to June 2002. The symptoms reported were sleep disorders 58%, headaches 41%, nervousness or distress 19%, fatigue (18%) and concentration difficulty 16%. Symptom related RFR exposure were identified with macro cell phone base stations 74%, cell phones 36%, cordless phones 29%, and power lines 27%. Fifty three percent reported their physical impairment was very severe or severe," and 35% reported medium impairment. Seventy percent reported they had at least one consultation due to their health complaints. Eighty-five percent of those complaining to public authorities were very "unsatisfactory." [59]

L. Potential tissue damage by Sommerfeld-Brillouin Precursors

- Sommerfeld and Brillouin precursors are endogenously induced, propagating, transient RFRs traveling faster than the exogenous source particles with a changed sinusoidal structure (about 6 times smaller amplitude) that displaces charged particles in human tissue (e.g., proteins, DNA, and ions of potassium, sodium, chloride, calcium, and magnesium, thus damaging those particles. "…as an electromagnetic field strikes and moves through a material, it exerts a mechanical force (F) on the charged particle in

the material." (A117) This article covered "…ultrashort pulses describable using frequencies from 100,000 Hertz (Hz) to 10^{11} Hz…However, IEEE C95.1, 1991 was developed from biomedical data on pulses whose onset and offset times (or rise and fall times) were much slower than those shown in Fig 2; the standard does not embody the precursors phenomenon. Thus, in practical term, the sharp ultrafast category of pulses being discussed are not covered by IEEE C95.1-1991 or by any other formal guideline known to us; therefore, the issue of potential issue damage mechanisms becomes particularly relevant for this category of electromagnetic events. **Until the issue of tissue damage mechanisms associated to pulses that cause precursors is fully studied, the authors recommend zero human exposure to such unique precursor and gendering pulses."** (A118; bold supplied by author) [60]

M. Wi-Fi RFR causes harm to living organisms

- From a review of the literature on harm to the male reproductive system from 2.45 GHz Wi-Fi radiation exposure using six eligible articles, it was shown there was degenerative changes to the testes, reduced testosterone level, increased apoptotic (dead) cells, and DNA damage. [61]
- MicroRNAs play an important role in the growth, differentiation, proliferation, and neuronal cell death by suppressing one or more target genes. More than 50% of miRNA are found in cancer-associated regions of the genome or in fragile sites; Sixteen Wistar Albino rats were divided into exposure and sham groups and exposed to 2.4 GHz Wi-Fi far-field RFR for 24 hours a day for 12 months. The results indicated that brain mir 107 expression was 3.3 times lower and miR-106b-5p expression 3.65 times lower in the exposure group than in the no Wi-Fi control group. The conclusion of the study was that "…long term exposure of 2.4 GHz RF may lead to adverse effects such as neurodegenerative diseases originated from the alternation of some miRNA expression…" (p. 410) Cancer and neurogenerative diseases may be triggered by the decline in mir 107. [62]

N. Nervous system disorders caused by RFR

- An individual was accidentally exposed to a cell phone from a down powered MCPBS emitting between 150,000 $\mu W/m^2$ and 6,000,000 $\mu W/m^2$ and suffered dysaesthesiae (abnormal sensation) of the scalp, neurological abnormally, headaches, unilateral left blurred vision, pupil constriction, unilateral altered sensation on the forehead, and abnormalities of current perception threshold on testing the left trigeminal ophthalmic nerve. His nerve function recovered in six months. [63]

O. Electromagnetic hypersensitivity (EMH) caused by RFR

- In a study of over 2,000 individuals reporting EMH and/or multiple chemical sensitivity (MCS), it was found that 80% of those with EMH presented "…one, two, or three detectable oxidative stress biomarkers in their peripheral blood meaning that overall these patients have a true objective somatic disorder… have a defect in the middle cerebral artery hemodynamics and…a tissue pulsometric index deficiency in the capsule-thalamic area of the temporal lobes, suggesting the involvement of the limbic system and the thalamus." From this, the researchers concluded that EHS is a "…neurologic pathological disorder which can be diagnosed, treated, and prevented." (Abstract) In Table 3, the authors listed the percentage of individuals who reported 23 clinical symptoms from prior research; those listed for over 49% or more were Headache 88%, fatigue 88%, dysesthesia 82%, concentration/attention deficiency 76%, insomnia 74%, loss of immediate memory 70%, ear heat/otalgia 70%, dizziness 70%, tinnitus 60%, depression tendency 60%, and transitory cardiovascular abnormalities 50%. "Suicidal ideation" was listed 20% by of the respondents. [64]
- In an article reviewing his earlier research, Olle Johansson stated that EMH individuals, in comparison with controls, demonstrate the following distinguishing characteristics:
- Increases in the number and pattern of mast cells in the upper dermis of the skin.
- Cytoplasmic granules were more densely distributed and more strongly stained.
- Differences were found for calcitonin gene-related peptide and eight other potential markers for Electrohypersensitivity individuals. (247) Further, EMH is an officially, fully recognized functional impairment in Sweden. [65]

P. Injury from 5G/4G Small Cell Antennas (SCAs)

- **Attributes of 5G/4G Small Cell Antennas (SCAs)**

5G Small Cell Antennas (SCAs) are sited about 100 meters apart in residential neighborhoods and contain one 5G, 2-15 degrees wide beam-formed antenna emitting RFR with frequencies from about 6 GHz to 120 GHz on demand from users, and three 4G antennas emitting RFR 24/7 up to about 6 GHz. [66] That means nearby residents will be in the midst of 4G 24/7 and limited 5G RFR emissions on demand with the potential health problems we discuss in the paper; in my opinion, the real purpose of 5G/4G SCAs is to position 4G in residential neighborhoods because of limited use of 5G. I am aware of only one measured reading of a 5G/4G small cell antenna: Boston, MA emitting power densities of 33,000 to 613,000 $\mu W/m^2$. [67]

- "Preliminary observations showed that MMM [millimeter waves] increase skin temperature, alter gene expression, promote cellular proliferation and synthesis of proteins linked with oxidative stress, inflammatory and metabolic processes, could generate ocular damages, affect neuro-muscular dynamics…available findings seem sufficient to demonstrate the existence of biomedical effects…" (p. 367) [68]
- This article investigated absorption of RFR at 2.4 GHz, 28 GHZ (the beginning of true 5G frequencies), and 95 GHz. Section 2 references "electron excitation" and Section 4 states "…human organ and tissue conductivity increases exponentially as the frequency increases…" (e.g., absorbance highest in the lung at 58.69% at 2.4 GHz and 66.49% at 28 GHZ, p. 13). "It means that the same material behaves electromagnetically different while being excited by waves of different frequencies." (p. 12/19) Further, the wavelength of the E and H fields inside tissue is shortened and the frequency accelerating approximately 5-8 times. [69]
- "…the coiled portion of the sweat duct in the upper skin layer is regarded as a helical antenna in the sub-THz band." (p. 208). The sweat gland's conductivity correlates with perspiration and human stress (physical, mental, and emotional), and led to a high specific absorption rate (SAR) of the skin in extremely high frequency band (e.g., 28 to 100 GHz). The authors conclude "…we are raising a warning flag against the unrestricted use of sub-THz technologies for communications, before the possible consequences for public health are explored." (p. 208) [70]
- Broadband frequencies over 10 GHz (e.g., 5G/4G SCAs) transmit data in very short time periods (e.g., a few milliseconds to several seconds), but there are indications that "…these bursts may lead to short temperature spikes in the skin of exposed people…The results also show that the peak to average ratio of 1,000 tolerated by the International Council on Non-Ionizing Radiation Protection guidelines may lead to permanent tissue damage after even short exposures highlighting the importance of revisiting existing exposure guidelines." (p. 705) [71]
- This article presented evidence that 5G will not only injure the skin and eyes as commonly believed, but also will have other adverse systematic effects as well. The article also criticizes most laboratory research that does not identify the most severe adverse effects that avoids real life conditions including no pulsed signals, no information wave, no modulation of the carrier signal, and/or no environmental contaminants which have adverse synergistic effects with RFR emissions to harm living organisms. [72]
- The following are excerpts from testimony on March 23, 2021 to the Pittsfield MA City Council by an unnamed 13-year-old on actual harm received from a MCPBS in their neighborhood:

"I have been calling into City Council meetings ever since my sister and I started getting headaches and dizzy from the cell tower. She gets skin rashes and we both get nauseous. Some nights we sleep with vomiting buckets on our pillow…Sometimes our symptoms are so bad we cannot log on to go to school…It has been months and nothing has been done to help our family or our neighborthood…I have to wonder if anyone in the city actually cares about the health of the children and residents…It makes some of us feel like what is the hope in trying if nothing changes." [73]

Q. Oxidative stress increases from RFR

- Primary cultured cortical neurons (cells transporting nerve impulses) were exposed to pulsed 1800 MHz modulated by a 217 Hz information RFR at an SAR of 2 W/kg for 24 hours. It was discovered (1) there was a significant increase in 8-OHdG, a biomarker of DNA oxidative damage in the mitochondria of neurons, and (2) there were reductions in the copy number of mitochondrial DNA (chromosome inside mtDNA and powerhouse of the cell; "mtDNA") and levels of mitochondrial

RNA (encodes RNA and 13 proteins). The oxidative damage to mtDNA may account for the neurotoxicity of RF radiation in the brain. [74]

R. DNA damage from RFR

- Individuals living within 80 meters of a MCPBS had significantly higher frequency of micronuclei, which are a biomarker of DNA damage from chromosome fragments or intact chromosomal instability not included in daughter nuclei during mitosis. Antioxidants were also shown to be damaged. [75]

S. Injury to living organisms other than humans

- In a review of the literature of harm to wildlife, it was found that pulsed telephony microwave radiation causes the following injury to wildlife:
- Damages the nervous system by altering electroencephalogram, changes in neural response, or changes in the blood brain barrier.
- Disrupts the circadian rhythm by interfering with the pineal gland and hormonal imbalance.
- Changes the heart rate and blood pressure.
- Impairs immunity towards pathogens, weakness, exhaustion, deterioration of plumage, and growth problems.
- Problems in nest building or impaired fertility; reduction in number of eggs, hatching percentage, and survival of newborn.
- Causes genetic and development problems, locomotion, partial albinism and melanism or promotion of tumors.

All of these injuries to wildlife were supported by references and the article is an excellent review for harm to wildlife and, inferentially, to humans from RFR. [76] DOI:10.1016/j.pathophys.2009.01.007]

- RFR from 900 and 1800 MHz cell phone base stations showed fewer male House Sparrow at locations with relatively high electric fields strength value of GSM base stations and indicate that long-term exposure to higher levels of radiation negatively affect the abundance or behavior of House Sparrows in the wild.[77]
- Tadpole eggs were subjected to electric fields of 1.8 (9300 $\mu W/m^2$) to 3.5 V/m (17,800 $\mu W/m^2$) from several MCPBSs at a distance of 140 meters for two months. The results were low coordination of movement and 90% mortality rate vs. normal movement and a 4.2% mortality rate in the control group. [78]
- Computer simulations were made of RFR absorption by four insects exposed to frequencies in the range of 2 GHz to 120 GHz (Cell phones broadcast at about 0.9 and 1.8 GHz and Wi-Fi broadcasts at about 2.4 and 5.8 GHz; 5G is defined as 28 GHz to 120 GHz). It was discovered that absorption of RFR was a function of frequency above 6 GHz and body length of the insect referenced to the frequency's wave length—as frequency wave length decreased to the length of the insect's body length, RFR absorption increases; thus, as 5G utilizes higher frequencies, wave lengths will decrease and insect RFR absorption will increase. An increase of 10% in power density above 6 GHz increased absorbed power from 3% to 370%. The article indicated that similar frequency behavior (increase, peak, decrease, and dependency upon body size) is found in humans. [79] I wonder if insects' increased absorption of shorter wave length RFR will result in the extinguishment of all insects from the introduction of 5G/4G Small Cell Antennas.

VII. Recommendations to avoid RFR-emissions from devices and antennas

Recommendations to understand and avoid RFR-emissions are as follows:

1. Purchase an RFR meter which measures power densities of RFR-emitting devices and antennas. The meter should indicate instantaneous peak PDs, peak hold PDs, and average PDs up to about eight gigahertz (8 Ghz).
2. Use the RFR meter to measure average, standard deviation, and coefficient of variation for peak PDs (*e.g.,* ten observations over a several minute period) in your home, workplace, automobile, and travel environment. The home should be measured along all outside walls for MCPBSs' emissions. Measure inside the home where you travel (e.g., hallways with breaker boxes) or spend stationary time such as chairs, sofas, beds, *etc.*; measure floor RFR emissions placing the RFR meter in a mobile cart. On repetitive automobile or bicycle journeys, measure RFR emissions from visible MCPBSs or 4G/5G SCAs. Use RFR peak standards from the Building Biology Institute and research literature provided herein and elsewhere as indicators of potential harm.
3. Do not use cell phones except for emergencies and if you do carry a cell phone, keep it in the off position because CPs emit emissions to find signals as you move. Remember that when you boot up or boot down, it will emit very high power densities (*e.g.*, 500,000 $\mu W/m^2$ peak). The best rule to avoid violation of the Right to Life Principle is do not carry a cell phone except in special situations (*e.g.*, out-of-town travel) and to keep the CP in the off position. Use a CP only a few minutes per month. Remember, RFR emissions, in the context of the Right to Life Principle, may have a 100% correlation with your long-run health. Use the speaker phone on a land line for telephone communications.
4. Do not use Wi-Fi. Use a hard-wired router connected to your computer with an Ethernet cable. Make sure the computer has the Wi-Fi turned off.
5. Keep all electrical emissions away from your head (*e.g.*, music plugs in your ears).
6. While this article focuses on RFR, it is important to find and measure independent electric fields in your environment. Thus, purchase a 60 Hz EF meter and measure EFs in your home with an emphasis on areas defined above. Wall EF emissions may be about 30 V/m declining about 5 V/m for each lineal foot from the wall; wall EF emissions may be reduced to near zero with insulated wiring or shielding paint on the wall. One of my three computers has an EF of 130 V/m at the laptop keyboard and an EF of 130 V/m at the external keyboard located three feet away; the rule is to measure electric fields of computer keyboards before you purchase the computer.

VIII. Legislative proposals to promote public education and limit power densities in urban environments.

The underlying purposes of legislation is (1) to educate the American people of RFR in their environment, (2) place limits on RFR emissions with consideration of power density limits recognized by the Building Biology Institute and discussed in the literature of harmful RFR, and (3) promote legislation that discloses power densities in your environment with the following recommendations:

1. Promote local legislation which requires written notice of peak power densities to buyers and lessees of residential real estate immediately around the outside and inside of the housing unit before purchase or rental. Inside recordings should show at least one average RFR peak hold (not average) power density within about six inches from the horizontal center of each wall. Statutory notice may be added to state or local law, or by requiring the Appraisal Standards Board to require reporting of RFR power densities in all real estate appraisals. Presently, they do not report power densities to buyers and lessees because they claim appraisers measure what typical buyers and sellers place value on and market participants do not measure power densities of RFR. [80] While this may be true, it is necessary to increase market knowledge of the harm from RFR so that real estate value determinants include radiation from RFR emitting antennas that surround and enter enclosed spaces used for habitation. Government has the duty to inform their citizens of harmful environmental conditions irrespective of how real estate market participants behave.
2. Require large commercial real estate to post dynamic power densities, if any of their outside walls are line-of-sight to a MCPBS or SCA within 1000 yards of the subject property, or if indoor power densities are over 500 $\mu W/m^2$.
3. Prohibit wireless devices in public buildings and medical facilities, and require meters showing dynamic power densities in $\mu W/m^2$ in these facilities. Cell phones should be turned off before entry outside the building because of high PD peaks (e.g., 500,000 $\mu W/m^2$) when they are booted down or up.
4. Require written notice of power densities for all wireless devices at point-of- sale.
5. Require every urban area to set aside naturally low power density geographical areas (e.g., 10 $\mu W/m^2$) as RFR emission free areas with no MCPBSs or 5G/4G SCAs permitted. These areas would include residential and commercial areas and main roads.

IX. Abbreviations

BBI - Building Biology Institute.

DE - Dirty electricity. Dirty electricity is caused by harmonics of 60 Hz alternating current electricity usually entering from off-site. DE may be reduced with the use of special filters inserted into wall plugs, which create small electric and magnetic fields.

Efs - Electric fields are force fields measured by volts per meter. EFs extend in the home from street wiring to the breaker box, then along wiring in the walls to the socket, then to an "off" appliance, and into the appliance when "on." They may be attenuated with distance, turning off electricity at the breaker box, shielded wiring (*e.g.,* metal

conducts), or grounded shielding paint on the interior walls of the home. EFs at the wall may be about 30 V/m declining about 5 V/m per lineal foot from the wall. Thus, it is wise to align furniture away from walls (e.g., headboard of bed in the center of the room) or use shielded wires or shielding paint.

EMF - Electromagnetic fields. There are four types of EMFs: Electric fields, magnetic fields, radio frequency field radiation, and dirty electricity.

Evs - Electron volts, a measure of radiation or energy level. Non-ionizing radiation exists at < 10 Evs.

IJAR 2018 - Herman Kelting "United States Congressional Research and Legislative Proposals to Educate the American People About the Power Density Safety of Wireless Communication ($\mu W/m^2$)" *Indian Journal of Applied Research,* Jan 2018, 8(1): 263-271

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MF - Magnetic fields measured by current in amps per meter in wiring. Attenuated by distance from the source.

PD - Power density measured in microWatts per square meter ($\mu W/m^2$) or per square centimeter ($\mu W/cm^2$). Telecommunications industry prefers $\mu W/cm^2$ because it is $1/10{,}000^{th}$ of $\mu W/m^2$ and very small, often less than 1.0; it seems safe and the decimals are difficult to compare with each other, unlike PDs measured by $\mu W/m^2$ which are greater than 1.0 and more easily comparable. Industry professionals also prefer reporting PDs in averages because averages are between 1/10th and $1/15^{th}$ of peaks or peak hold. The FCC uses averages and the Building Biology Institute uses peak PDs for its standards of safety because it is peaks that harm cells and organs. RFR meters measure peaks from only one source emitter among many nearby source emitters because the broadcasting time per emission is so short (e.g., 1 GHz = 0.000000001 seconds) that it is nearly impossible for two or more emissions to occur at precisely the same time. Thus, if one measures peak PD from two adjacent MCPBSs, the meter reading will measure peaks from only one of the two MCPBSs peaks at any point in meter time, thus understating the potential injury by an estimated 50%. As the number of nearby RFR emitters increases, the percentage of understatement declines even more.

RLP - Right to Life Principle.

RFR - Radio frequency radiation consists of the perpendicular joining of EFs and MFs at about three wave lengths from the antenna measured in power densities. Power densities do not necessarily measure modulation differentials.

SAR - Specific Absorption Rate. A measure of heat generated in organic systems from RFR, which is known to damage tissue. European Union has an SAR limit of 2.0 W/kg and in the US 1.6 W/kg. It has been shown that RFR injures living organisms independent of safe SARs.

X. DISCUSSION

Our interest in this research was to provide evidence to show that RFR devices and antenna injure living organisms and thereby may violate the Right to Life Principle defined as "Every person has the right to a natural birth and legitimate survival and development into adulthood without environmental or other systematic injury to their well-being". We have shown that non-ionizing radiation energizes electrons to change orbits (but not leave the atom like ionizing radiation) and return to the ground orbit emitting energy all of which destabilizes the atom, molecule, cells, and organs from up to X-ray emissions.

We have also shown that endogenous Sommerfeld and Brillouin precursors stimulated from exogenous RFR almost certainly damage living tissues and have not apparently been studied since one of the original articles published in 1994. Evidence is provided showing that four hours of daily cell phone use results in a 55% reduction in sperm which translates to 9.53% remaining sperm morphology in three generations and potential irreversible infertility, RFR exposure to rodents, insects, and storks ending in irreversible infertility, RFR dose dependent changes in women's cord blood, children exposed to prenatal and postnatal cell phones with an odds ratio of 1.80 of emotional and hyperactive problems at age 7, and seventh grade children who had the most exposure to cell phones had less accurate memory and task learning skills. RFR damages the immune system, increases DNA single and double strand breaks, damages the blood brain barrier, changes intracortical excitability, and increases oxidative stress and free radicals, the latter of which damages DNA, RNA, and proteins. RFR damages stem cells which were shown to be *the most relevant cellular model to measure health risks from mobile communications (italics supplied by author).* Ninety-three of 100 studies found that RFR causes reactive oxygen species and damage to DNA causing cancer. Eight of 10 studies found harm to those living less than 500 meters from MCPBSs. There was damage to the side of trees facing MCPBSs emitting a median 995 $\mu W/m^2$ peak power density, and cancer rates near MCPBSs 4.15 times higher than the entire population. Wi-Fi was found to cause degenerative damage to the testes, damage to DNA, and reduced sperm count. Evidence showed that electromagnetic hypersensitivity was a well-defined pathological neurologic disorder and 5G/4G Small Cell Antennas were linked with oxidative stress and inflammatory and adverse metabolic processes. There was damage to neurons and DNA from a 1800 MHz pulsed RFR. RFR was shown to reduce sparrow and stork populations. International standards for antenna emissions vary from 10,000,000 $\mu W/m^2$ in the US to as low as 10 $\mu W/m^2$ in New South Wales, Australia. India reduced safe limits by 90% on 01.09.2012 showing the obvious error in their original standards.

Evidence has been furnished for college and high school students requesting special testing environments because of high levels of anxiety, stress, and depression, which may to be caused by RFR emitting devices, and increased levels of actual and contemplation of suicide since 2008, soon after the massive increase of cell phones, Wi-Fi, and MCPBSs. MCPBSs are located in the midst of urban areas with peak PD emissions up to 200,000 $\mu W/m^2$ and sometimes over 50,000 $\mu W/m^2$ within less than 100 feet of residential property and concentrations of people in residential areas, commercial centers, and roadways. The injuries caused by these RFR concentrations violate the Right to Life Principle harming human's natural birth, survival, and development. While many of you may support a woman's choice in *Roe vs. Wade*, 410 US 113 (1973), everyone has the constitutional duty to support legitimate survival and development and promote humanity as we knew it before wireless communications crept upon us under the preposterous FCC standards for MCPBSs of up to 10,000,000 $\mu W/m^2$ and absence of radiation standards for body proximate RFR emitting devices in the US.

XI. CONCLUSIONS

This paper was written to define the Right to Life Principle in the context of harmful RFR from cell phones, Wi-Fi, MCPBSs, *etc.* causing injury to living organisms. Non-ionizing radiation was shown to excite electrons driving them to higher-energy orbits destabilizing atoms, molecules, and organs with a release of up to X-ray energy upon returning to the ground orbit with reductions in pulsing RFR; similarly, neurons and DNA are physically affected by RFR probably causing anxiety, stress, and depression and destabilizing the brain. Seventeen categories of injuries supported by 58 research articles and the testimony of one 13-year-old of illnesses from 5G/4G SCA emissions. We have shown that living organisms have been extinguished in the presence of RFR and that high school and college students are suffering anxiety, stress and depression requiring longer testing times and private testing rooms, which may be caused by body proximate RFR devices and MCPBSs. .We recommend purchasing RFR meters for educational purposes, reducing substantially the use of cell phones and other body proximate RFR emitting devices to reduce exciting electrons, and encouraging legislation and the Appraisal Foundation Board to expose high RFR in local areas thereby promoting reduced RFR emissions.

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