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Santa Rosa, CA 95403

Rec'd at Meeting	12/10/19
Item No.	3.1
From:	Pat Bakalian

December 10, 2019  
Testimony for Santa Rosa City Council Study Group on Wireless Facilities

Good Afternoon Mayor Schwedhelm and Council members,

I am here for my grandchildren who have no voice in their increasingly hazardous polluted environment. Wireless Radio Frequency Radiation is a form of pollution and it's increasing exponentially.

You have heard factual testimony today. I want to add specific concerns about children, about our future and their future.

From the Environmental Health Trust:

Children are not little adults. Children's skulls are thinner and tissues of a child's head, including the bone marrow and the eye, absorb significantly more energy than those in an adult head. It is scientifically accepted that children are more vulnerable to the biological effects of microwave exposure than adults due their rapidly developing body systems. Children's stem cells are more affected by microwave radiation. No studies show that microwave radiation exposure in children is safe or that continuous exposure from cell phones, cell towers, cordless phones, Wi-Fi routers, baby monitors, etc. is safe. FCC guidelines are inadequate:

- They are out of date, having been set in 1993
- The guidelines were based solely on preventing thermal effects, i.e. heating. Yet numerous peer-reviewed, published studies report non-thermal effects indicating biological changes from exposure to non-thermal radiation levels.
- The guidelines do not account for exposure to multiple sources and only consider 30 minutes of exposure from one device at a time.
- The guidelines do not consider research showing that current cell phones can produce ["hotspots" in the brains](#), and are, thus, not in fact non-thermal.
- The guidelines were based on an adult male body's absorption of radiation. [Children's smaller bodies and brains](#) were not considered in the metrics.
- The guidelines consider average exposures, not peak exposures. Research suggests our biology is affected by the erratic nature of the signal and that cells respond to short intense bursts of radiation even if the average over time seems low.

The American Academy of Pediatrics (AAP), the largest US medical association of pediatricians and pediatric specialists, recommends that the US government *tighten* wireless exposure limits and that the public *reduce* children's exposure to cell phones and other devices that emit wireless radiation. The AAP also cautions that

## **Bakalian attachments**

### **Statement by U.S. Conference of Mayors CEO & Executive Director Tom Cochran on FCC's Order Proposing to Usurp Local Property Rights**

**Washington, DC**—Below is a statement by U.S. Conference of Mayors CEO and Executive Director Tom Cochran on recent FCC proposals diminishing local government ownership rights over local rights-of-way and other public property:

“The U.S. Conference of Mayors strongly opposes recent proposals by the Federal Communications Commission to grant communications service providers subsidized access to local public property and to dictate how local governments manage their own local rights-of-ways and public property. This unprecedented federal intrusion into local (and state) government property rights will have substantial adverse impacts on cities and their taxpayers, including reduced funding for essential local government services, as well as an increased risk of right-of-way and other public safety hazards.

“We believe the courts will conclude that FCC’s proposals are based on misguided interpretations of federal law. Congress previously addressed and resolved these issues resoundingly in favor of local and state governments and their property rights. The Conference and its member cities reject efforts by this unelected federal regulatory agency to improperly invade state and local government authority by compelling local elected officials to subsidize, or “gift”, local public property to a small, favored group of private businesses. According to FCC’s own estimates, just one of these actions – the proposed small cell rules – threatens future revenues to local (and state) governments by billions of dollars over the next decade.

“The Conference of Mayors strongly opposes these proposals and calls on the agency to change them; absent such changes, the Conference and its members will seek relief in federal court to overturn this unprecedented overreach by the FCC.”*The American Academy of Pediatrics*

#### *Medical recommendations on Cell Phones, Cell Towers and Wireless Radiation*

The American Academy of Pediatrics (AAP), the largest US medical association of pediatricians and pediatric specialists, recommends that the US government *tighten* wireless exposure limits and that the public *reduce* children’s exposure to cell phones and other devices that emit wireless radiation. The AAP also cautions that cell tower radiation is linked to headaches, sleep problems and depression in scientific research studies.

The AAP issued the following cell phone safety tips on their webpage [Healthy Children Webpage on Cell Phones](#). They specifically recommend to reduce exposure to wireless radiation





Brain scans of cell phone radiation  
absorption at different ages.

Reprinted from O. Gandhi et al IEEE Transactions on Microwave Theory & Techniques, 1996.

Brain scans show children absorb more radiation than adults. The World Health Organization classifies wireless radiation as a possible carcinogen. Cancer can take decades to develop. It is important to reduce children's exposure now.

***Protect children from cell phones and other wireless radiation devices.***

[www.emfsafetynetwork.org](http://www.emfsafetynetwork.org)

# Protect the ones you love.



## American Academy of Pediatrics Recommends:

### REDUCE CELL PHONE AND WIRELESS RADIATION

- Do not hold the cell phone up to your head. Use speaker mode or hands free to limit radiation exposure to the brain.
- Avoid carrying your phone against the body like in a pocket, sock, or bra. Cell phone manufacturers can't guarantee that the amount of radiation you're absorbing will be at a safe level.
- Make only short or essential calls on cell phones.
- If you plan to watch a movie on your device, download it first, then switch to airplane mode while you watch in order to avoid unnecessary radiation exposure.
- Keep an eye on your signal strength (i.e. how many bars you have). The weaker your signal, the harder your phone has to work and the more radiation it gives off.
- Avoid making calls in cars, elevators, trains, and buses. The cell phone works harder (and emits more radiation) to get a signal through metal.
- Remember that cell phones are not toys or teething items.

from AAP's [HealthyChildren.org](http://HealthyChildren.org)

### RESEARCH SHOWS:

Cell phone/Wi-Fi radiation can damage the developing **brain**, **sperm**, and **sleep**. Research indicates **increased cancer risk**, **headaches**, **hyperactivity**, and **memory problems** from cell phone radiation.

All wireless devices emit the same type of radiation as cell phones.

### AT HOME:

Easily reduce wireless radiation at home. Get a **corded landline phone** and forward cell phones to it.

### 100% SAFETY = CORDED ETHERNET CONNECTIONS

Use **non-wireless corded connections** for printers, mouse, computers, laptops, tablets, video game systems, e-readers, routers, keyboards, headphones, speakers, and other accessories—**with all wireless functions off**.

MORE AT [EHTrust.org](http://EHTrust.org)



# The Dark Side of 5G - How it is Affecting Bees, Birds, Cows -

By Orlean Koehle, State President Eagle Forum of California, author of the book *5G Dangers and Deception of Powerful, New Wireless Technology*

Rec'd at Meeting 12/10/19  
Item No. 3  
Book "Whoa Nellie!"  
From: Orlean Koehle



Have you noticed strange looking beige or silver "bucket-devices" now hanging from telephone poles, or tall round "dunce cap"- devices on top of LED light poles? These are all the various shapes that 5G small cell antennas come in. If you see them, it means that your city, your county and your state is now becoming "5G-deployed."

**What is 5G and Why is It in My State?** 5G stands for the 5<sup>th</sup> Generation of wireless technology, which has been continually updated every ten years. When cell phones were first developed 50 years ago, they were 1G; ten years later 2G; ten years later 3G (the flip-top phones); the last ten years we have had 4G. Soon, we will be switching to 5G,

not only on cell phone towers, cell phones, but in all wireless devices, tablets, laptops, Wi-Fi, etc. At first it will be 4G and 5G combined. State legislators have voted for bills allowing 5G into your state because of all the great things they have been promised about it: 1) *greater speed (to move more data) – 10 x faster*, 2) *lower latency (to be more responsive)*, 3) *the ability to connect a lot more devices at once (for sensors and smart devices)*. You will be able to download a movie in 6 seconds, when it used to take 24 hours. 5G promises to be so much better for business. It will help usher in the Internet of Things (IoT) where all wireless and electrical devices can be connected, so much better for fast data collection and for big business. We are promised "5G will bring in \$500 billion to our economy and 3 million jobs."

**What Could Be the Dark Side of 5G?** Have you been told anything about 5G being tested for health and safety, how it will effect human or animal life? Have you been told that 5G will be operating on a much higher electromagnetic frequency (EMF), a very dangerous, harmful frequency? 4G was 2.5 gigahertz (GHz); 5G will be at least 28 GHz or higher. It could be 100 GHz. It will be operating in a microwave or millimeter range, a weapon range – the same range as a DEW (Direct Energy Weapon), such as lasers. In fact, it is the 5G weapons race that keeps the U.S. and other countries pushing forward with implementing 5G. They don't want China to be the 5G weapon master as they are declaring themselves to be.

**Microwave Ovens Can Be Turned Off, but You Will Have No Way to turn off 5G:** Have you been warned that it is not safe to stand in front of your microwave oven when it is on? Well, how about a 5G bucket antenna that is broadcasting non-stop, 24 hours a day, from your telephone pole or light pole, 20-40 feet from your home, or school, or place of business? The 5G antenna may be especially close to your children's upstairs bedroom, and you will have no control of it. You cannot turn it off. What will the constant EMF rays do to your children's health and to your own?

**Twenty Thousand 5G Satellites Soon to Be in the Skies:** And just in case there is a spot on earth that has not yet been covered with 5G small cell antennas, never fear – a satellite will be near. Elon Musk of Tesla has been given permission to launch 12,000 of those, and many have already been launched. Other high tech companies will be launching other ones. All 20,000 are to be in the sky by 2022. It appears that there will be very little places that people can go to - to escape 5G.

**Who is Responsible?** Who has allowed 5G into our states, counties and cities? There are five groups to lay the blame on:

1. **Executive Branch:** I'm sorry to say, President Trump, who is all about promoting big business, passed an executive order in January of 2018, authorizing broadband service for every rural part of our nation – so all farmers can have 5G cell phone coverage. He also signed the "Farm Bill," in December of 2018, which does the same thing – brings in 5G to rural areas, and even gives grant money to implement it for small towns under 10,000 population.
2. **Congressmen,** who receive large donations from the wireless industry, have authored a bill to "streamline" or speed up 5G, making it mandatory in every state and setting a uniform price for the installation of the small cell antennas. It was tried last year and this year, but so far has not passed.
3. **The FCC,** Federal Communications Commission, passed a rule on their own in September 2018 trying to make 5G mandatory, and threatening to sue any city or county who refuses it – as if that would be in violation of the national commerce clause of the Constitution. The FCC is a "captured agency," greatly behold to the cell phone industry, whom they are supposed to regulate, but instead they help them and promote them in every way they can.
4. **State Legislators,** who probably also receive large donations from the wireless industry, author and try to pass similar bills as Congress - to streamline, make mandatory, and set the costs for the implementation of 5G throughout their state.
5. **County and City Governments:** If the state has not passed legislation mandating 5G, then county and city leaders can decide for themselves, and often they will say yes. Why? Because they receive lots of money from the wireless industry per each small cell antenna that is put on telephone poles or light poles. That adds up to maybe \$300 or higher per antenna, sometimes 3 to a pole – for hundreds or maybe thousands of poles – in other words – lots of money!





## *“Whoaa Nellie!”*

*5G Dangers and Deception of  
Powerful, New Wireless  
Technology*

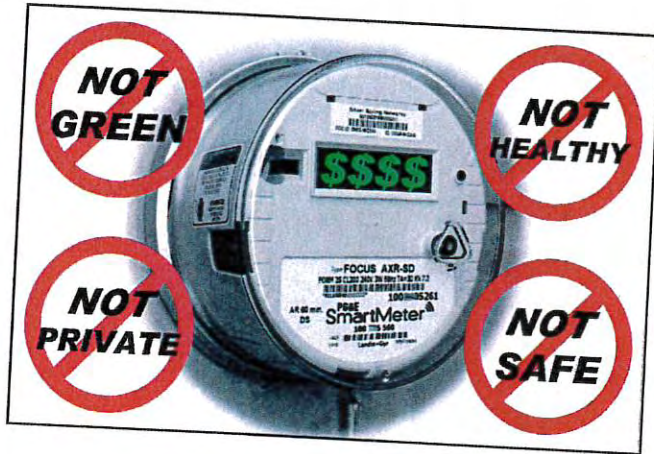
**ORLEAN KOEHLE**

**Updated 2019**

Rec'd at Meeting	<u>12/10/19</u>
Item No.	<u>31</u>
From:	<u>Orlean Koehle</u>



# JUST SAY NO TO BIG BROTHER'S SMART METER



**A Wireless Radiation Bio-Hazard**

Updated 2019

**Orlean Koehle**

Rec'd at Meeting 12/10/19  
Item No. 3.1  
From: Orlean Koehle



To: Santa Rosa City Council et al  
From: Katya Miller, US Capitol Fellow, Wash. DC;  
Sonoma County for Responsible Technology  
10 December 2019

Rec'd at Meeting	12/10/19
Item No.	3.1
From:	Katya Miller

I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Katya Miller, and I am a Mother, Grandmother, Resident of Oakmont, co-founder of Sonoma Country for Safe Technology, and Researcher and Author with a Fellowship at United States Capitol in Washington, DC.


The current wireless telecommunications facilities (WTFs), misleadingly called "small cells", already are undermining the cardiac function of people in Santa Rosa and, if not removed, will continue to do so. Research shows increases in heart rate, arrhythmias, dizziness, increase in blood pressure, and other disturbances in the heart's cardiovascular functioning following exposure to wireless radiation.

Several studies reported changes in EEG after prolonged repeated exposure to radiofrequency radiation such as WTCs deploy, immediate and short-term effects are also common.

The people of Santa Rosa are and will continue to experience increased sympathetic activity and decreased parasympathetic activity of the autonomic nervous system as a result of these facilities. Diminished health and productivity of and increased health care expenditure to Santa Rosa residents and workers will be the result. I submit onto the public record substantial evidence in the form of relevant peer-reviewed scientific studies as evidence.

I have expressed no "concern" or any other non-substantive matter, but solely matters of fact and law. I accept your oath of office.

Signed,

  
Katya Miller [miller.katya@gmail.com](mailto:miller.katya@gmail.com)



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# Mechanism of low-level microwave radiation effect on nervous system

Hiie Hinrikus ✉, Maie Bachmann, Denis Karai & Jaanus Lass

Pages 202-212 | Received 04 Jul 2015, Accepted 17 Aug 2016, Published online: 22 Nov 2016

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## ABSTRACT

The aim of this study is to explain the mechanism of the effect of low-level modulated microwave radiation on brain bioelectrical oscillations. The proposed model of excitation by low-level microwave radiation bases on the influence of water polarization on hydrogen bonding forces between water molecules, caused by this the enhancement of diffusion and consequences on neurotransmitters transit time and neuron resting potential. Modulated microwave radiation causes

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Literature Review

# Effects of acute exposure to WIFI signals (2.45GHz) on heart variability and blood pressure in Albinos rabbit

Article · Literature Review · September 2015 with 484 Reads ⓘ

DOI: [10.1016/j.letap.2015.08.015](https://doi.org/10.1016/j.letap.2015.08.015)

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Methods used: Electrocardiography



**The effects of prenatal exposure to a 900-MHz electromagnetic field on the 21-day-old male rat heart.**Türedi S<sup>1</sup>, Hancı H<sup>1</sup>, Topal Z<sup>1</sup>, Ünal D<sup>2</sup>, Mercantepe T<sup>3</sup>, Bozkurt İ<sup>4</sup>, Kaya H<sup>5</sup>, Odacı E<sup>1</sup>.**Author information**

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**Abstract**

The growing spread of mobile phone use is raising concerns about the effect on human health of the electromagnetic field (EMF) these devices emit. The purpose of this study was to investigate the effects on rat pup heart tissue of prenatal exposure to a 900 megahertz (MHz) EMF. For this purpose, pregnant rats were divided into experimental and control groups. Experimental group rats were exposed to a 900 MHz EMF (1 h/d) on days 13-21 of pregnancy. Measurements were performed with rats inside the exposure box in order to determine the distribution of EMF intensity. Our measurements showed that pregnant experimental group rats were exposed to a mean electrical field intensity of 13.77 V/m inside the box (0.50 W/m<sup>2</sup>). This study continued with male rat pups obtained from both groups. Pups were sacrificed on postnatal day 21, and the heart tissues were extracted. Malondialdehyde, superoxide dismutase and catalase values were significantly higher in the experimental group rats, while glutathione values were lower. Light microscopy revealed irregularities in heart muscle fibers and apoptotic changes in the experimental group. Electron microscopy revealed crista loss and swelling in the mitochondria, degeneration in myofibrils and structural impairments in Z bands. Our study results suggest that exposure to EMF in the prenatal period causes oxidative



# Effect of Wireless Network Radiation on Heart Rate Variability

Barjinder Singh Saini and Anukul Pandey

**Abstract**—The health risk associated with the increased exposure to wireless network devices like Mobile Phones, Wi-Fi etc, had been area of concern. In this paper, the effects of wireless network radiations (WNR) on Heart Rate Variability (HRV) had been investigated. The two non-linear indices namely i) Approximate Entropy (ApEn) ii) Detrended Fluctuation Analysis (DFA) had been used for deciphering the hidden dynamics of HRV. The study comprised of 19 healthy male subjects in the age group of 23±4.3 (mean ±std dev) years. The Electrocardiogram (ECG) of each subject obtained under three different WNR exposure modes namely i) Least or minimum exposure: when WNR level is  $0.49 \pm 0.12 \text{ mW/m}^2$  ii) Moderate exposure: when WNR level is  $2.08 \pm 0.27 \text{ mW/m}^2$  iii) Maximum or calling mode exposure: when WNR level is  $1.65 \pm 0.32 \text{ W/m}^2$ . The results indicate that there is a significant increase in DFA scaling exponent when the WNR level changed from minimum to maximum value, as p-value <0.05, whereas the change in mean value of ApEn was not significant due to higher standard deviation among all the subjects. The WNR exposure caused changes in HRV indices and it varied with WNR level, but all the changes cannot be considered as p values were higher.

radiation exposure [11], [12].

Heart rate variability (HRV) is a non-invasive clinical tool to measure status of physiological, cardiac and autonomic nervous system (ANS) [13], [14]. The ANS modulates the cardiac pacemaker and provides beat-to-beat regulation of the cardiovascular rhythm. Linear and non-linear techniques can be used to analyze HRV [15], [16]. The present study attempts to find cardiovascular effect of wireless network radiation emitted by mobile phone and BTS in healthy young male volunteer easy chair sitting position.

## II. MATERIALS AND METHODS

In this study 19 healthy male subjects in the age group 23±4.3 (mean ± standard deviation) years have been participated. The electrocardiogram (ECG) of each subjects of 20 minutes duration was obtained using Zephyr Bioharness™ physiological monitoring system under three different WNR exposure modes namely (i) approximately 800 meters from nearest BTS without mobile phone (where

## Electromagnetic energy radiated from mobile phone alters electrocardiographic records of patients with ischemic heart disease.

[Alhussainy A<sup>1</sup>](#), [Al-Nimer M](#), [Majeed A](#).

### Author information

<sup>1</sup> Department of Medicine, College of Medicine, Diyala University, Diyala, Iraq.

### Abstract

**BACKGROUND:** Electromagnetic energy radiated from mobile phones did not show significant effect on the blood pressure, heart rate, and electrocardiographic (ECG) parameters in animals and humans.

**AIM:** This study aimed to investigate the effect of radiofrequency of mobile phone on the electrocardiographic parameters in patients with history of ischemic heart disease, taking into consideration the gender factor.

**SUBJECTS AND METHODS:** A total number of 356 participants (129 males and 227 females) were admitted in this study. They were grouped into: subjects without cardiac diseases (Group I), patients with ischemic heart disease (Group II), and patients with history of cardiac diseases not related to myocardial ischemia (Group III). Electrocardiogram was obtained from each patient when the mobile phone was placed at the belt level and over precordium in turn-off mode (baseline) and turn-on mode for 40 sec ringing. The records of ECG were electronically analyzed.

**RESULTS:** Prolongation of QTc interval was significantly observed in male gender of Groups I and III ( $P < 0.001$ ). Male patients of Group II showed significant QTc interval prolongation ( $P = 0.01$ ) and changes in the voltage criteria ( $P = 0.001$ ). These changes were not observed in female patients with ischemic heart disease. The position of mobile at the belt level or over the precordium showed effects on the heart.

**CONCLUSIONS:** The radiofrequency of cell phone enlarges the QT interval in human beings and it interferes with voltage criteria of ECG.



## 900 MHz pulse-modulated radiofrequency radiation induces oxidative stress on heart, lung, testis and liver tissues.

Esmekaya MA<sup>1</sup>, Ozer C, Seyhan N.

### Ⓒ Author information

<sup>1</sup> Department of Biophysics, Gazi University, Faculty of Medicine, 06510 Beşevler, Ankara, Turkey. mericarda@yahoo.com

### Abstract

Oxidative stress may affect many cellular and physiological processes including gene expression, cell growth, and cell death. In the recent study, we aimed to investigate whether 900 MHz pulse-modulated radiofrequency (RF) fields induce oxidative damage on lung, heart and liver tissues. We assessed oxidative damage by investigating lipid peroxidation (malondialdehyde, MDA), nitric oxide (NOx) and glutathione (GSH) levels which are the indicators of tissue toxicity. A total of 30 male Wistar albino rats were used in this study. Rats were divided randomly into three groups; control group (n = 10), sham group (device off, n = 10) and 900 MHz pulsed-modulated RF radiation group (n = 10). The RF rats were exposed to 900 MHz pulsed modulated RF radiation at a specific absorption rate (SAR) level of 1.20 W/kg 20 min/day for three weeks. MDA and NOx levels were increased significantly in liver, lung, testis and heart tissues of the exposed group compared to sham and control groups (p < 0.05). Conversely GSH levels were significantly lower in exposed rat tissues (p < 0.05). No significant difference was observed between sham and control groups. Results of our study showed that pulse-modulated RF radiation causes oxidative injury in liver, lung, testis and heart tissues mediated by lipid peroxidation, increased level of NOx and suppression of antioxidant defense mechanism.

PMID: 21460416 DOI: [10.4149/gpb\\_2011\\_01\\_84](https://doi.org/10.4149/gpb_2011_01_84)

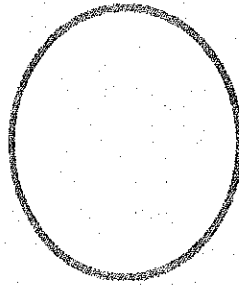
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# NON-THERMAL EFFECTS AND MECHANISMS OF INTERACTION BETWEEN ELECTROMAGNETIC FIELDS AND LIVING MATTER

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An ICEMS Monograph



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## The influence of the call with a mobile phone on heart rate variability parameters in healthy volunteers.

Andrzejak R<sup>1</sup>, Poreba R, Poreba M, Derkacz A, Skalik R, Gac P, Beck B, Steinmetz-Beck A, Pilecki W.

### Author information

<sup>1</sup> Department of Internal Medicine, Occupational Disease and Hypertension, Wrocław Medical University, Wrocław, Poland.

### Abstract

It is possible that electromagnetic field (EMF) generated by mobile phones (MP) may have an influence on the autonomic nervous system (ANS) and modulates the function of circulatory system. The aim of the study was to estimate the influence of the call with a mobile phone on heart rate variability (HRV) in young healthy people. The time and frequency domain HRV analyses were performed to assess the changes in sympathovagal balance in a group of 32 healthy students with normal electrocardiogram (ECG) and echocardiogram at rest. The frequency domain variables were computed: ultra low frequency (ULF) power, very low frequency (VLF) power, low frequency (LF) power, high frequency (HF) power and LF/HF ratio was determined. ECG Holter monitoring was recorded in standardized conditions: from 08:00 to 09:00 in the morning in a sitting position, within 20 min periods: before the telephone call (period I), during the call with use of mobile phone (period II), and after the telephone call (period III). During 20 min call with a mobile phone time domain parameters such as standard deviation of all normal sinus RR intervals (SDNN [ms])--period I: 73.94+/-25.02, period II: 91.63+/-35.99, period III: 75.06+/-27.62; I-II: p<0.05, II-III: p<0.05) and standard deviation of the averaged normal sinus RR intervals for all 5-mm segments (SDANN [ms])--period I: 47.78+/-22.69, period II: 60.72+/-27.55, period III: 47.12+/-23.21; I-II: p<0.05, II-III: p<0.05) were significantly increased. As well as very low frequency (VLF [ms<sup>2</sup>])--period I: 456.62+/-214.13, period II: 566.84+/-216.99, period III: 477.43+/-203.94; I-II: p<0.05), low frequency (LF [ms<sup>2</sup>])--period I: 607.97+/-201.33, period II: 758.28+/-307.90, period III: 627.09+/-220.33; I-II: p<0.01, II-III: p<0.05) and high frequency (HF [ms<sup>2</sup>])--period I: 538.44+/-290.63, period II: 730.31+/-445.78, period III: 590.94+/-301.84; I-II: p<0.05) components were the highest and the LF/HF ratio

## The influence of the call with a mobile phone on heart rate variability parameters in healthy volunteers.

Andrzejak R<sup>1</sup>, Poreba R, Poreba M, Derkacz A, Skalk R, Gac P, Beck B, Steinmetz-Beck A, Pilecki W.

### Author information

<sup>1</sup> Department of Internal Medicine, Occupational Disease and Hypertension, Wrocław Medical University, Wrocław, Poland.

### Abstract

It is possible that electromagnetic field (EMF) generated by mobile phones (MP) may have an influence on the autonomic nervous system (ANS) and modulates the function of circulatory system. The aim of the study was to estimate the influence of the call with a mobile phone on heart rate variability (HRV) in young healthy people. The time and frequency domain HRV analyses were performed to assess the changes in sympathovagal balance in a group of 32 healthy students with normal electrocardiogram (ECG) and echocardiogram at rest. The frequency domain variables were computed: ultra low frequency (ULF) power, very low frequency (VLF) power, low frequency (LF) power, high frequency (HF) power and LF/HF ratio was determined. ECG Holter monitoring was recorded in standardized conditions: from 08:00 to 09:00 in the morning in a sitting position, within 20 min periods: before the telephone call (period I), during the call with use of mobile phone (period II), and after the telephone call (period III). During 20 min call with a mobile phone time domain parameters such as standard deviation of all normal sinus RR intervals (SDNN [ms])--period I: 73.94+/-25.02, period II: 91.63+/-35.99, period III: 75.06+/-27.62; I-II: p<0.05, II-III: p<0.05) and standard deviation of the averaged normal sinus RR intervals for all 5-mm segments (SDANN [ms])--period I: 47.78+/-22.69, period II: 60.72+/-27.55, period III: 47.12+/-23.21; I-II: p<0.05, II-III: p<0.05) were significantly increased. As well as very low frequency (VLF [ms<sup>2</sup>])--period I: 456.62+/-214.13, period II: 566.84+/-216.99, period III: 477.43+/-203.94; I-II: p<0.05), low frequency (LF [ms<sup>2</sup>])--period I: 507.07+/-201.33, period II: 758.28+/-307.90, period III: 627.09+/-220.33; I-II: p<0.01, II-III: p<0.05) and high frequency (HF [ms<sup>2</sup>])--period I: 1073.63, period II: 730.31+/-445.78, period III: 590.94+/-301.64; I-II: p<0.05) components were the highest and the LF/HF ratio





Radiat Environ Biophys. 1979 Feb 23;16(1):15-27.

## Effects of modulated RF energy on the EEG of mammalian brains. Effects of acute and chronic irradiations.

Takashima S, Onaral B, Schwan HP.

### Abstract

The effects of modulated radio frequency fields on mammalian EEGs were investigated using acute and chronic irradiations at non-thermal level. The EEG signals were computer processed to obtain power spectra. Rabbits were exposed to the field for 2 h a day for 6 weeks at 1-10 MHz (15 Hz modulation) at the level of 0.5-1 kV/M. Silver electrodes placed on the skull surface were used for recording of the EEG. Usually they were removed immediately after initial recordings of the EEG and reinserted before the final and intermediate EEG recordings. With this arrangement, modulated RF fields produced a change in EEG patterns by enhancing the low frequency components and decreasing high frequency activities. On the other hand, acute irradiations did not produce noticeable changes in the EEG at the level of 0.5-1 kV/M (1-30 MHz, 60 Hz modulation) as long as the use of intracranial electrodes was avoided.

PMID: 472107 DOI: [10.1007/bf01326893](https://doi.org/10.1007/bf01326893)

[Indexed for MEDLINE]



Rec'd at Meeting 12/10/19  
Item No. 3.1  
From: Megan Jerkovic

Testimony To Santa Rosa City Officials

I attest and affirm that the following statements are true, accurate and within my personal knowledge  
My name is Megan Jerkovic and I am a Santa Rosa resident, a Second grade teacher at Bennett Valley Union School District and mother of an infant and a kindergartener.

The CA Supreme Court ruled on 4/4/19 in T Mobile vs San Francisco that all California cities have the police powers to ensure that wireless transmission facilities or WTFs do not "incommode the quiet enjoyment of the streets." The definition of "incommode" was extended to include noise, negative health consequences and safety concerns.

Also, all applications for "small cell" facilities are now INCOMPLETE until the applicant provides the court mandated NEPA (National Environmental Policy Act) Environmental Assessment (EA) and/or Environmental Impact Statement (EIS) for each facility. This NEPA review was mandated by the 8/9/19 DC Circuit Court of Appeals Ruling in Case #18-1129. This decision applies nationwide and is retroactive to 8/9/19. The regulations include requirements for compliance with Section 106 of the National Historic Preservation Act (NHPA) as well.

In addition, the DC Circuit Court of Appeals further ruled against an FCC overreach on October 1, 2019. In Case 18-1051, on page 146, re: Restoring Internet Freedom, 33 FCC Rcd. 311 (2018) ("2018 Order") the Ruling states:  
"[Because] the Commission's Preemption Directive, see 2018 Order #194-204, lies beyond its authority, we vacate the portion of the 2018 Order purporting to preempt 'any state or local requirements that are inconsistent with [the Commission's] deregulatory approach[.]' see id."

Due to these decisions, it is necessary that you immediately stop all placement, construction, modification and operations of new, recent, and applied-for WTFs.

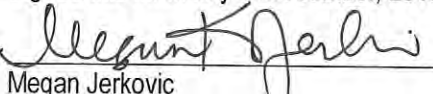
Please write a letter to your wireless applicants that all of their applications are incomplete. The required EAs or EISs must include negative health consequences and safety concerns, as per the 4/4/19 CA Supreme court ruling. This will give Santa Rosa time to update it's Telecommunications Ordinance. Let's have reasonable setbacks of these towers to where people sleep, live and heal.

Finally, please note that the copper wires and fiber-optic cables already in place were financed with public money, reside in public conduit or on poles in the public rights-of-way, and cannot lawfully be claimed or used by unregulated private Wireless companies as if they were private property purposed for private profit.

Let's look at what San Leandro did. They installed fiber optic cable throughout their city, in order to provide WIRED connections. Check out litsanleandro.com for more info.

I have expressed no "concern" or any other non-substantive matter, but solely matters of fact and law. I accept your oath of office.

Signed this tenth day of December, 2019.



Megan Jerkovic  
4261 Leafwood Circle East  
Santa Rosa, CA 95405



Rec'd at Meeting	12/10/19
Item No.	3.1
From:	Alex Krohn

Alex Krohn, Resident of Santa Rosa, CA

To: Santa Rosa City Council

RE:12/10/19 Santa Rosa City Council agenda item 3.1- WIRELESS SMALL CELL DEPLOYMENT ON CITY OWNED STREET LIGHTS AND JOINT UTILITY POLES

I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Alex Krohn. I am a licensed Physical Therapist and I work and live in the city of Santa Rosa. I address herein slides prepared by city official Gabe Osburn.

Slide 3 (Exhibit A, attached)- The amendment to council policy 300-04 was drafted and presented to staff on Feb 14<sup>th</sup>, 2017 by Eric Mchenry and Verizon representative Ms. Canada. The presumed exemption of so-called "small cells" (hereinafter wireless telecommunications facilities (WTFs)) to our City Code 20-44 is without merit. We have submitted evidence onto the public record that proves the same equipment and technology used for macro towers are being used for "small cells". In addition, we have proof that the amended Council policy 300-04 addenda for applications were not complete prior to the execution of the master license agreements. Therefore, these two contracts are void *ab initio*.

Slide 10 (Exhibit B, attached)- This 2016 California Public Utilities Commission (CPUC) order was used throughout this process by City staff persons to advise the City Council, falsely, that it had no jurisdiction over the placement of WTFs on joint PG&E Utility poles. City staff further used this document to advise the City Council not to adopt an ordinance to regulate the placement (and thereby any other activity) of WTFs on PG&E poles. These public officials were, and still are, *ultra vires* in so doing.

Slide 13 (Exhibit C, attached) This map is highly inaccurate, indicating falsely, the only contracted Joint Utility Poles under contract according to the information attained from the City staff and their website were for only 41 poles. This slide is showing 52 Utility Poles. Such incompetency makes it unreasonable to expect the City to maintain an accurate, precise, detailed and dynamic website portal such as it proposed (Slide 23).

Slide 15 (Exhibit D, attached)- Mr. Osburn falsely categorizes "health" as a mere "concern", despite the established science pertaining to adverse health effects, which already occur in Santa Rosa and will increase with additional WTF irradiation of Santa Rosa homes, schools, workplaces and other institutions. Such peer-reviewed scientific literature as we have voluminously submitted is admissible under the Supreme Court Daubert Rule, and cannot be refused, ignored, or mischaracterized. The Communications Act of 1934, of which the Telecommunications Act of 1996 (TCA) is in amendment, states as its very purpose "to protect safety and property". Therefore, health, safety, property value, lack of notification and environmental impact are substantive and cannot lawfully be suppressed or dismissed out of hand, as has been done in this slide.

I have expressed no "concern" or any other non-substantive matter, but solely matters of fact and law. I accept your oath of office.

Signed this 10<sup>th</sup> day of December 2019

Alex Krohn [Krohnalex82@gmail.com](mailto:Krohnalex82@gmail.com)

A handwritten signature in blue ink, appearing to read "Alex Krohn", is written over a horizontal line.

Alex Krohn, Resident of Santa Rosa, CA

To: Santa Rosa City Council

RE:12/10/19 Santa Rosa City Council agenda item 3.1- WIRELESS SMALL CELL DEPLOYMENT ON CITY OWNED STREET LIGHTS AND JOINT UTILITY POLES

### Addendum

#### Exhibit A

## PAST COUNCIL ACTIONS

### **Council Policy 300-04**

- Adopted in July of 2000
- Generally tailored for large macro cell sites

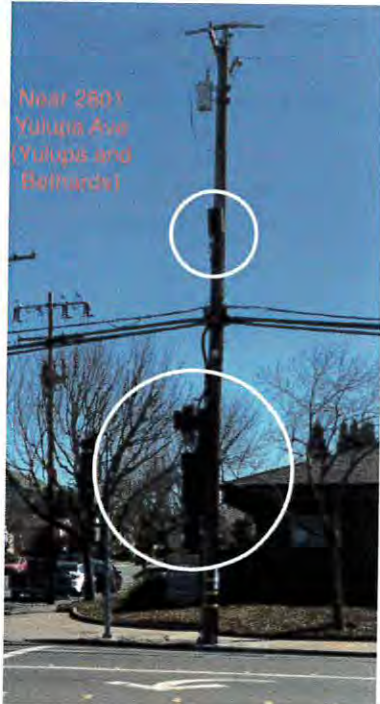
### **Amendment to Policy 300-04 – February 2017**

- Small cell deployments on city owned infrastructure in right-of-way
  - Master License agreement
  - Site license agreement for each individual location
  - Annual license fee
  - Execution authority to City Manager or designee



3

#### Exhibit B



## **Small Cells**

### **Joint Utility Poles**



### **Legal Framework**

California Public Utilities Commission

Decision 16-01-046 – January 28, 2016

Verizon has right-of-way access rights per the modified right-of-way decision of 2016. By way of this decision, PG&E is mandated to provide access to its poles for pole top antennas belonging to Verizon. The process involves Verizon submitting an application and construction drawings, and pole loading calculations are also performed to ensure structural integrity. Verizon is solely responsible for constructing to G095 compliance and for retaining any jurisdictional permitting required.

PG&E does not get to choose which poles may be encumbered with an antenna on the basis of property value or aesthetic reasons.

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Alex Krohn, Resident of Santa Rosa, CA

To: Santa Rosa City Council

RE:12/10/19 Santa Rosa City Council agenda item 3.1- WIRELESS SMALL CELL DEPLOYMENT ON CITY OWNED STREET LIGHTS AND JOINT UTILITY POLES

### Addendum

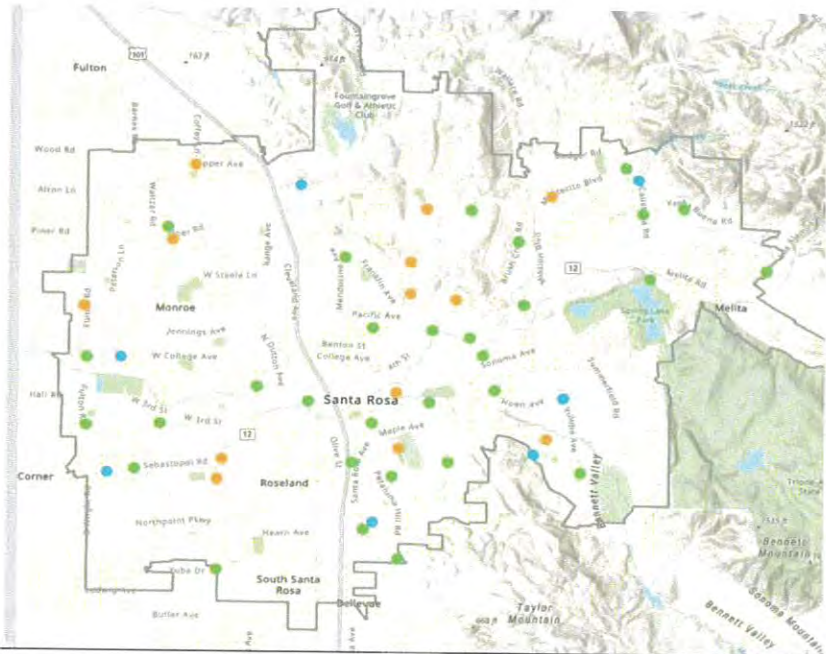
#### Exhibit C



#### Current Deployments Joint Utility poles

#### Verizon

- Completed (31)
- Not Started (14)
- Undergrounding and Cable (7)



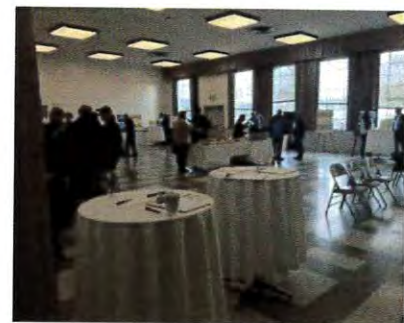
#### Exhibit D



### Community Concerns

#### Residential Area Concerns

- Health risks – RF exposure
- Aesthetics – loss of property value
- Saturation
- Lack of notification
- Environmental impact – back up batteries



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Rec'd at Meeting 12/10/19  
 Item No. 3.1  
 From: Paul-André Schabracq

**MEMO**

<u>to:</u>	Tom Schwedhelm, Mayor and Santa Rosa City Council Members: Victoria Fleming, John Sawyer, Chris Rogers Ernesto Olivares, Jack Tibbetts
<u>from:</u>	Paul-André Schabracq, <b>PAS</b> Danan Schabracq Trust 137/139 Scott Street, Santa Rosa <i>pas8@comcast.net</i>
<u>date:</u>	December 5, 2019
<u>subject:</u>	Approval of 45/5G Close Proximity Microwave Radiation Antennas (CPMRA)

**The Bottom Line**

**Apart from the well-documented adverse health effects, the issue facing City Council is whether it is more important to install CPMRA wireless facilities throughout the city resulting in significantly reduced property values and thereby lowering property tax revenue versus the doubtful benefits of enhanced 4G and 5G wireless connectivity.**

**In addition, the City may well face serious liabilities since the telecom companies are not insured for injuries nor the health impacts from microwave radiation and seek to stick taxpayers with the tab. See the attached letter from Harry Lehman, Attorney.**

**Proximity to wireless cell transmission facilities significantly reduces property values**

Research indicates that over 90% of home buyers and renters are less interested in properties near wireless transmission facilities (*WTF's*) and would pay less for a property in close vicinity to WTF's. Documentation of a price drop up to 20% is found in multiple surveys and published articles as listed below.

**The US Department of Housing and Urban Development (HUD) considers wireless transmission facilities as "Hazards and Nuisances."**

- HUD requires its certified appraisers to take the presence of nearby WTF's into consideration when determining the value of a single-family residential property.
- HUD prohibits FHA underwriting of mortgages for homes that are within the engineered fall zone of wireless transmission facilities.

<https://archives.hud.gov/offices/hsg/sfh/ref/srh1-18f.cfm>

**The FHA guide for appraisers states that:** *"The appraiser must indicate whether the dwelling or related property improvements are located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc)."*

The **California Association of Realtors' Property Sellers Questionnaire** specifically lists "cell towers" on the disclosure form for sellers of real estate. The seller must note "neighborhood noise, nuisance or other problems from. " and includes cell towers and high voltage transmission lines on the long list problems.

**The National Institute for Science, Law and Public Policy's (NISLAPP) survey**  
***"Neighborhood Cell Towers & Antennas—Do They Impact a Property's Desirability?"***

initiated June 2, 2014, has now been completed by 1,000 respondents as of June 28, 2014. The survey, which circulated online through email and social networking sites, in both the U.S. and abroad, sought to determine if nearby cell towers and antennas, or wireless antennas placed on top of or on the side of a building, would impact a home buyer's or renter's interest in a real estate property.

- The overwhelming majority of respondents (94%) reported that cell towers and antennas in a neighborhood or on a building would impact interest in a property and the price they would be willing to pay for it. And 79% said under no circumstances would they ever purchase or rent a property within a few blocks of a cell tower or antenna.
- 94% said a cell tower or group of antennas on top of, or attached to, an apartment building would negatively impact interest in the apartment building or the price they would be willing to pay for it.
- 79% said under no circumstances would they ever purchase or rent a property within a few blocks of a cell tower or antennas.
- 88% said that under no circumstances would they ever purchase or rent a property with a cell tower or group of antennas on top of, or attached to, the apartment building.
- 89% said they were generally concerned about the increasing number of cell towers and antennas in their residential neighborhood.

The NISLAPP also wanted to know whether respondents had previous experience with physical or cognitive effects of wireless radiation, or if their concern about neighborhood antennas was unrelated to personal experience with the radiation.

Of the 1,000 respondents, 57% had previously experienced cognitive effects from radiation emitted by a cell phone, wireless router, portable phone, utility smart meter, or neighborhood antenna or cell tower; 63% of respondents had previously experienced physical effects from these devices or neighborhood towers and antennas.

<https://www.businesswire.com/news/home/20140703005726/en/Survey-National-Institute-Science-Law-Public-Policy>



## STUDIES ON IMPACTS OF WIRELESS TRANSMISSION FACILITIES

The Appraisal Journal in 2006, found that buyers would pay as much as 20 percent less for a property near a cell tower or antenna. "*The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods,*"

Sandy Bond, Ph.D., Ko-Kang Wang, "*The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods,*" The Appraisal Journal, Summer 2005, Source: Goliath business content website.

"*Cellular Phone Towers: Perceived impact on residents and property values*" University of Auckland, paper presented at the Ninth Pacific-Rim Real Estate Society Conference, Brisbane, Australia, January 19-22, 2003; Source: Pacific Rim Real Estate Society website,

*A Field Guide to Cell Towers, The National Association of Realtors*

*The effect of distance to cell phone towers on house prices* S. Bond, Appraisal Journal, Fall 2007, Source, Appraisal Journal (Found on page 22) See also *Using GIS to Measure the Impact of Distance to Cell Phone Towers on House Prices in Florida*

*Florida State University Law Review Volume 24 | Issue 1 Article 5 1996 The Power Line Dilemma: Compensation for Diminished Property Value Caused by Fear of Electromagnetic Fields*

*New Zealand Ministry for the Environment, "Appendix 5: The Impact of Cellphone Towers on Property Values"* Source: New Zealand Ministry for the Environment website

*Powers, turbines and transmission lines impacts on property value* edited by Sally Bond Sally Sims and Peter Dent, 2014

*Cell Towers are Discussed in the Written Testimony of Bobbi Borland Acting Branch Chief, HUD Santa Ana Homeownership Center Hearing before the Subcommittee on Insurance, Housing and Community Opportunity U.S. House of Representatives Committee on Financial Services on "The Impact of Overhead High Voltage Transmission Towers and Lines on Eligibility for Federal Housing Administration (FHA) Insured Mortgage Programs"*  
*Saturday, April 14, 2012*

Harry Vere Lehmann,  
Principal Attorney

Law Offices of Harry V. Lehmann  
4 Vineyard Court  
Novato, California 94947

Rec'd at Meeting	12/10/19
Item No.	3.1
From:	Harry Lehmann
Area Code 415	
Telephone: 897-2121	
Facsimile: 898-6959	

December 10, 2019

Respectfully, to Mayor Tom Schwedhelm  
and the Santa Rosa City Council

Re: Compliance with the federally-required NEPA initial study must take place and dangers to all life our area including pollinators, along with Ordinance issues, mandate further study by Santa Rosa prior to any 5G distribution.

Dear Mayor and Council –

I have been appearing before public governance boards for more than nine years in attempts to bridge the gap between what the science shows and the viewpoints all of us for a long time adopted about the hazards associated with cellular regulation. The first time I appeared in this regard was probably in support of the original San Francisco Cellular Telephone Ordinance in 2010.

During these intervening years, the core scientific realities have now come from increasingly credible sources, you are by now aware of course of the report of the National Toxicology Program of the U. S. National Institutes of Health concerning the results of the NTP's \$25 million, 30 month study of whether cellular radiation causes cancer cells, and in fact glioma cells are found to occur.

It is naturally the case that as I've been invited to make more presentations, much of the same material is repeated, hopefully, sharpened. Today's letter to you has many of the attributes of my presentation to the City of Napa earlier this month; those factors are chosen here because we in Marin and Sonoma are also concerned with agriculture.

Yet, when I think of speaking to you in Santa Rosa, the 'love one another' lines Youngbloods 60's song Get Together keeps coming to mind. Could we please, in Santa Rosa, all of us, acknowledge that we are each and all affected by the risks of high density communications microwave, and so we should work to get back to caring about each other, look carefully at the science, take this issue seriously, and stop 5G deployment

until at least the law is complied with, and also the health consequences, ***and Santa Rosa's liability exposure*** have been seriously taken into account. Care for the humans, care for the bees, we are all in this together.

Most of all, you, as individual members of this Council, are not at fault for the fact that you now find yourselves in a difficult position, because you relied on what you were told by industry, and now we have a GIGO problem, as best illustrated by one of the most important articles you can read on this subject, from The Nation magazine, in particular from the March 29, 2018 edition, please put this in your browser:

<https://www.thenation.com/article/how-big-wireless-made-us-think-that-cell-phones-are-safe-a-special-investigation/>

As interpreted by the District of Columbia Circuit on August 9<sup>th</sup>, requires that, affecting our whole nation, that the most preliminary NEPA report is required to be completed before the approval of applications for telecom antenna placement in the public right of way. Also, there is the legal point, as I currently understand it, that the proposed enabling Ordinance was not actually passed by your Council two years ago, so that we've all been without that legal rudder since then, an additional factor supporting that all 5G and 4G applications have to be re-submitted, re-examined and at the least the NEPA report completed before allowance of permits for these radiation-intrusive structures.

The goal of this letter is to sufficiently acquaint you with mainstream science findings which indicate possible harm to all DNA organisms in the Santa Rosa Valley, from people to grapes, from the proposed dense installation of what are being labeled as 5G small cell antennas.

In order to acquaint you with these data quickly, this piece is broken down into several sub-categories. The main thrust here is to provide hard data demonstrating that further study by the City of Santa Rosa is mandated by the proven nature of cellular microwave impact on living things. Provided below are issues which it is respectfully suggested make it best for all of us if this Council will please table the approval of any telecom antenna permit applications until, as speedily as possible, technical, scientific, and legal analysis can be provided to the members of this Council on these issues:

1. Whether dense antenna installation presents peculiar risks of harm to the vineyards and wineries in the Santa Rosa Valley as a whole, due to pollinator impairment.



2. Whether, in the opinion of your City Attorney, recent developments in federal and California case law broaden the alternatives to cities facing dense microwave deployment.
3. Whether, mainstream scientific data indicates that saturating Santa Rosa residents with intense 24/7 microwave will cause health problems for those residents, including: 2) Whether the increase in density of microwave carcinogens resultant from the proposed 5G rollout is a phenomena which through its cumulative constancy of exposure constitutes a reportable hazard within the context of California law pertaining to endangerment of minors.
4. Whether the City of Santa Rosa faces greater liability and litigation expense from the issuance of these permits than it does from any telecom lawsuit threats.
5. Whether the possible use of 3G and 4G frequencies in what is being sold as a 5G rollout has DNA rupture differentials in effect based upon frequencies.

This is provided to you electronically so that the people of the City of Santa Rosa and residents of the Santa Rosa Valley generally can access the data stated here. Due to intermittence in the effectiveness of the pasted in links supplied with this letter, the reader is encouraged to cut each link and plug it into your chosen browser.

1. Science findings regarding pollinator navigation show needed further study

There is a risk to all pollinators in the Santa Rosa Valley from the now proposed high-density telecom antenna permit applications. This discussion will be on bees.

Bees navigate by magnetic orientation. Please see the thorough discussion on this titled *Honey bees navigate using magnetic abdomens*:

<https://physicsworld.com/a/honey-bees-navigate-using-magnetic-abdomens/>

See also from *Nature* a 2016 article titled *Magnetic Sensing through the Abdomen of the Honey bee* which can be found at:

<https://www.nature.com/articles/srep23657>

Clear and convincing evidence including from the first two able studies prove that the abdomens of honey bees have magnetite and that this provides directional and return guidance.

It is not claimed here that Hive Collapse Disorder is a single cause process or that microwave exposure is the sole cause. The harm from mites is recognized. The existence of solid studies showing bees perception of polarized light is a navigation source including in very low light conditions is also recognized.

Rather than making any overreaching pitch, it is suggested that the data are sufficient to indicate that study of the relationship between pollinator survival and microwave installation should be examined, not only by appropriately qualified persons with environmental scientific credentials, but also by the City Attorney in light of potential lawsuits against the City of Santa Rosa derivative from decreased yields experienced by affected vineyards.

Our windshields used to clog with insects, especially in low elevation roads, like out on 37, especially between 101 and Black Point, or on 121 before Arnold Drive or on highway 12 between Ford's Corner and the Santa Rosa line. We don't see that any more. A recent study showed more than 75 percent decline over 27 years in total flying insect biomass in the sample areas studied in Germany - see Hallmann CA, Sorg M, Jongejans E, Siepel H, Hofland N, et al. (2017).

All life is built of DNA, not just our rapacious human species. It is scientifically established that exposure to cellular mast radiation will cause tree withering proportional to exposure. Please see a careful a 26 page study report on the effects of radiofrequency radiation on trees around mobile phone base stations can be found through your search for the unusual title 'Bernartzky (1986), revisited'. Quoting briefly from the Abstract, after a discussion of methods; "*The measurements of all trees revealed significant differences between the damaged side facing a phone mast and the opposite side, as well as differences between the exposed side of damaged trees and all other groups of trees on both sides.*" (emphasis added) These findings are consistent with the determination by Dr. Henry Lai of the University of Washington School of Medicine that *DNA strand fracture results from cellular signal exposure*. There is a particularly instructive article on Dr. Lai in Seattle magazine, as information exchange in a lawsuit turned up a memo from one telecom advocate to another about how to 'war game' against Dr. Lai.

Briefly, as thoroughly discussed in a ten page letter to Assembly Appropriations dated July 19, 2017 in opposition to CA SB 649 ( available at [www.greenswan.org](http://www.greenswan.org)) in 1983, a team at the University of Maryland found that establishing a 7.43 concentration of DNA to plain water resulted in a 24-fold increase in the Specific Absorption Rate of the resulting fluid, compared to the plain water used as a base, *and that the mechanism was 'acoustic,' in physics language, not ionic*. This is consistent with the way a microwave oven works, which is that heat is the *result* of molecular agitation, *not the cause*. The industry-lap-dog FCC continues to push that the mechanism of causation is thermal despite the fact that our own federal government, after \$25 million dollars and the efforts of our best toxicology scientists proved that the cancer mechanism is non-thermal.

Since the swaths of more dense development in the Valley tend naturally to reside across the Valley on level land, all insects and birds which transit the more developed and antenna-dense areas will experience decrease in magnetite-based navigational accuracy.

In considering these issues it is helpful to comprehend the mass extent of industry practices in pruning publicly available information, in this regard see the article entitled How Big Wireless Made Us Think Cell Phones Are Safe, by Mark Hertsgaard and Mark Dowie in the March 29, 2018 edition of The Nation magazine:

<https://www.thenation.com/article/how-big-wireless-made-us-think-that-cell-phones-are-safe-a-special-investigation/>

People concerned with the preservation of the Santa Rosa wine culture and industry here should join together, on this Council and as friends, to insure that these issues be decently studied before permit approval. The heart of the Valley is at stake in more ways than one.

2. Recent developments in Federal and California case law broaden the alternatives to cities facing dense microwave deployment.

On Aug 9, 2019, the DC Circuit Court of Appeals ruled in Case 18-1129: the ruling means that The FCC/Wireless Industry must now complete a NEPA Environmental Assessment (EA) and/or Environmental Impact Statement (EIS) BEFORE any CPMRA application can be considered complete. This signals a broad and accomplished modification of applicable law, including as to presently pending permit applications. Under these circumstances it respectfully suggested that the City Attorney should be allowed to determine by research and opinion report whether any arguably applicable CPMRA shot clocks should now be considered tolled, perhaps with re-set proviso as an adjunct aspect.

On Oct 1, 2019, the DC Circuit Court of Appeals ruled in Case 18-1051: the ruling means the FCC willingly pulled their own teeth and no longer regulate the Internet (web pages, video/music streaming, online gaming and other information services).

Therefore, it is humbly and respectfully suggested that the City Attorney or other unbiased counsel determine whether it is true, as we believe, that whatever preemption was and remains, Big Wireless has NO PREEMPTION to install or operate personal wireless facilities that emit wireless "information services" transmissions in any municipality in the USA, including Santa Rosa. Therefore as to those increased services,



which can be delivered without radiation through fiber optic means, the decision should and does reside with local governance.

This also means that the Wireless Industry only has preemption to place, construct and modify personal wireless facilities for wirelessly transmitting "telecommunications services" (i.e. voice transmissions).

In the above regard, the proven absence of a significant gap in Verizon's voice transmission coverage in Santa Rosa is a very important factor in the Council's 11/5/19 decision. It is respectfully suggested that it is not necessary for the City of Santa Rosa to 'rush to signature' a Accommodation Agreement for these unnecessary CPMRA installations — because Santa Rosa residents can currently make calls on Verizon Wireless everywhere that Verizon is proposing to install a CPMRA.

The that the recent restrictions on the FCC grab should be taken seriously, taking into account that this is the DC Circuit, ruling on the FCC's power grabs, which Circuit sets the lighthouse for many other Courts. Thanks to Paul McGavin for his contributions to this area of this document.

3. Whether, mainstream scientific data indicates that saturating Santa Rosa residents with intense 24/7 microwave will cause health problems for those residents, including: 2) Whether the increase in density of microwave carcinogens resultant from the proposed 5G rollout is a phenomena which through cumulative constancy of exposure constitutes a reportable hazard within the context of California law pertaining to endangerment of minors.

It has been long established for about two decades from the work of Dr. Henry Lai of the University of Washington School of Medicine that cellular telephone wavelengths cause DNA fracture. That a generally prevailing concern about EMF radiation now exists is buttressed by, for one, the publication by Scientific American in October of an article by Dr. Joel Moscowitz of the University California Berkeley tells us of potential health consequences from 5G dispersal as currently contemplated by giant telecom. The national toxicology program of the United States government's National Institutes of Health issued its final report on November 2, 2018 following 2 ½ years

On May 27, 2016 the National Toxicology Program (hereafter NTP) of the U. S. National Institutes of Health (hereafter NIH) issued its first report on results of the NTP's \$25 million study of whether cellular non-ionizing radiation causes cancer. The NTP determined that cellular radiation causes an increased risk of cancer, including the thereby-forced creation of glioma cells, the root cells of glioblastoma, the deadly brain cancer. The study also showed that the radiation caused the formation of the cells which

cause acoustic neuroma in humans. On 2/27/16 when the NTP study results were made public, a thorough discussion of the findings appeared in a *Mother Jones* article titled; ***“Game-Changing” Study Links Cellphone Radiation to Cancer***, which you can easily find. Then followed nearly two years of further peer review until March 28<sup>th</sup> of 2018, when, at the end of a three day peer consortium on the issue in Research Triangle NC the NTP used the clarifying language that their \$25 million study showed ‘clear evidence’ that cellular radiation causes cancer. ***But that wasn’t the NTP’s final word on whether cellular microwave causes cancer.***

The final report of the National Toxicology Program on the NTP’s \$25 million study was issued on November 2, 2018. This final report confirmed the finding that microwave radiation from cellular sources is carcinogenic, and that the mechanism of harm is non-thermal. The entire industry-influenced ‘regulatory,’ standards used by the FCC are based on the assumption that the only possible mechanism of tissue damage is thermal. The best website for your obtainment of scientific findings is [www.ehtrust.org](http://www.ehtrust.org), for The Environmental Health Trust. At the EHT site, please see the letters to school districts from Dr. Martha Herbert, a Pediatric Neurologist at Massachusetts General Hospital and on the faculty of the Harvard Medical School, citing hundreds of studies. Hundreds of pages could easily be taken simply to list sources on this subject yet there are sufficient sources stated above to show the 5G cancer hazard to all Santa Rosa residents.

To state it briefly: There is a sufficient national professional scientific and medical consensus that microwave radiation, especially in near-field, is harmful, such that prudent administrative and legislative practices should include the completion of a review of the health consequences from increased multi-axial microwave saturation.

4. **Whether the City of Santa Rosa faces greater liability and litigation expense from the issuance of these permits than it does from any telecom lawsuit threats.**

The great thing about getting a written opinion letter from a lawyer is that they lawyer is thereafter stuck with it, right or wrong. For example, after the National Toxicology Program of the U. S. National Institutes of Health determines that cellular radiation causes cancer cell formation, where such an antenna generating such carcinogenic waves is permissively placed, with revenue, on a publicly owned utility pole, isn’t this therefore a Dangerous Condition of Public Property?

Because of what they were repeatedly told, and believed in good faith, few professional administrators have studied deeply in this field. Seldom to we find professional administrators who have spent more than a half hour giving serious consideration to the actual language of the Act. As advocates our experience with government advisory lawyers are very uneven. Some lawyers, whether or not agreeing on a core point, will evidence actual study. Others, appear to parrot simplistic interpretations of complex and science areas.

There are, for one example, legal issues concerning the extent to which application to situations of 'direct physical harm' is not consistent with language norms ubiquitous when that Bill was passed. The Act puts forth wattage limits, and preemption only applies to approved wattage levels, whereas it has been from time to time found, including by sophisticated meter reading in the field, that actual field antenna strength has been far greater than claimed

But, beyond that, would you, as responsible souls on this Council, want people who were damaged from radiation they had no way to avoid, to go without recompense on a technicality like that? There are sophisticated legal arguments on this, in my view Separation of Powers is at the crucible of it. But it is suggested that any experienced lawyer long engaged with governmental entities would agree with the following points, not involving rocket science:

- 1) The defendants in a lawsuit do not get to choose whether to be sued. That choice is made by plaintiffs' counsel.
- 2) Once the involved cellular antenna box is attached to the governmental utility pole with telecom as the tenant, the Doctrine of Fixtures from ordinary landlord tenant law applies and a melding takes place, and plaintiffs' counsel will allege, as is consistent with the law, that the melded unit as a whole is now Public Property.
- 3) The main CA Government Code section which is pled by experienced public entity lawyers is Dangerous Condition of Public Property, Government Code 835.
- 4) There is now overwhelming evidence of DNA and cellular damage from radio-frequency EMF as emitted by cellular phones and towers. Therefore, 5G's close proximity radiation source is 'dangerous' under Government Code 835.
- 5) Liability of the County of Santa Rosa and other regional and local governmental and regulated entities (here we go, PG&E again) will be alleged, and in legal logic and fact shown to exist on multiple other basis, including joint venture and with the damages resulting from the concurring actions of independent tortfeasors under the Summers v. Tice approach, see 33 C2d 80.
- 6) In California and elsewhere, 'joint and several liability' means that a 1% liability contributor has 100% of financial responsibility from a loss in the instance of the insolvency (or in this instance unavailability if the 1996 Act is sustained) , ***the result of the combination of the factors stated above is that all financial burdens from cellular injury are shifted to the taxpayers.***

Bottom line, if 5G is allowed in Santa Rosa in every case that arises from people claiming injury, whether that injury is in reality from cell phones or towers, industry will say that the 1996 Act protects them, but not the involved local entities. A far more detailed



explanation of this issue can be found in the above July 19, 2017 letter to Assembly Appropriations from our successful effort against CA SB 649. Importantly, 5G does not create a 'risk' of injury, like some essential medicines, because the participation of our bodies in microwave saturation is not a choice; 5G thus creates a constant hazard, not just a risk of injury. Allowing 5G in Santa Rosa is morally wrong for the above reasons.

4. Whether the possible use of 3G and 4G frequencies in what is being sold as a 5G rollout has DNA rupture differentials in effect based upon frequencies.

The wavelengths primarily used for telephonic communication at the 800 MHz range with spillover the 1900 MHz. As the numbers get bigger the waves get shorter and the tops of the waves closer together.

The frequencies with the lower numbers carry data more easily than the frequencies with the higher numbers.

As the numbers get higher it will take more power to pump any given cluster of data. This boils down to money, in terms of dollars spent per corresponding units of power.

We have sometimes encountered situations where persons in policy positions understood that they were approving 5G so-called 'small cell' antennas in greatly increased density (quarter mile intervals common), but where the language of the actual permit included a great variation in the frequencies which the applicant would be allowed to permit to issue from the antenna involved.

Maybe this is beneath the dignity I try for, but it occurred to me that if one were to think of this in golfing terms, the lower frequencies at the 800 MHz range especially (with spillover the 1900 MHz) are like a TaylorMade M6 Driver, it will hit the ball a long distance; the 5G is more like a putter.

As the frequency goes up the distance that ball can be driven diminishes the higher the frequency to lower the effective range because it's not a very good frequency it's not very efficient frequency.

It is my understanding that in Santa Rosa 800 MHz and 1900 MHz by spillover are the primary frequencies that your use for telephonic processes because those are very efficient and that means dollar efficient frequencies takes less energy and energy cost money; 800 MHz or the 1900 MHz venue have far greater penetration range than 5G which is the technical justification for this 5G dispersal. The effect of this is that if the 5G signal is sufficient to allow receipt in a room in your residence, then it is sufficient to bathe you in microwave 24/7.

It is beyond any letter to treat this fully. It is of independent value to have understand the basics of frequencies and penetration and range, and that's all which I've sought to get across here. In addition, if sometimes a telecom person might say or imply 'don't worry, it's just 4G,' the data show that isn't a good thing to couple unavoidable long reach signal with constantly penetrating high density.

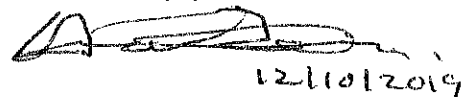
### Conclusion

This is a hastily assembled letter, taking assistance from many, and in several instances tailoring language from prior works involving Marin County or then-pending California legislation, and most of all I have included the same pollinator data as was recently submitted to Napa, because, like I said, and the lyrics of that 60's song refrained, we are all in this together.

The core point defended here is that there exist a substantial number of issues which should be vetted carefully before the City of Santa Rosa proceeds with further so-called 5G applications for permit. The term 'so-called,' is not stated out of meanness, but simply to clarify that many such applications have been found to contain immense elasticity wattage and type, with such issues left to the later un-encumbered choice of the telecom provider, in a situation, which is the main point here, that this stuff needs to be studied, first.

In order to provide the broadest level of documented sources of scientific expertise a copy of a letter from Beatrice Golomb MD PhD, Professor of Medicine, University of California, San Diego, is attached to the electronic, but due to the pages taken (22) for the 360 scientific presentations, not the paper, variant of this letter. My assignment is to provide data sources, the data are clear that cellular microwave is carcinogenic as well as damaging to agriculture, and, here, to the historic Santa Rosa wine culture which has made this valley the destination it is today.

Very truly yours,



12/10/2019  
Harry V. Lehmann



Beatrice Alexandra Golomb, MD, PhD  
Professor of Medicine  
UC San Diego School of Medicine  
9500 Gilman Drive, #0995  
La Jolla, CA 92093-0995  
Phone: 858 558-4950 x201

August 18, 2017

To whom it may concern,

**I urge in the strongest terms that you vigorously oppose California SB 649.**

**If this bill passes, many people will suffer greatly, and needlessly, as a direct result.**

**This sounds like hyperbole. It is not.**

My research group at UC San Diego alone has received hundreds of communications from people who have developed serious health problems from electromagnetic radiation, following introduction of new technologies. Others with whom I am in communication, have independently received hundreds of similar reports. Most likely these are a tip of an iceberg of tens or perhaps hundreds of thousands of affected person. As each new technology leading to further exposure to electromagnetic radiation is introduced – and particularly introduced in a fashion that prevents vulnerable individuals from avoiding it – a new group become sensitized to health effects. This is particularly true for pulsed signals in the radiowave and microwave portion of the spectrum, the type for which the proposed bill SB 640 will bypass local control.

**Mechanisms by which health effects are exerted** have been shown to include oxidative stress (the type of injury against which antioxidants protect, see optional section below), damage to mitochondria (the energy producing parts of cells), damage to cell membranes<sup>1, 21</sup>, and via these mechanisms, an impaired “blood brain barrier”<sup>3-5</sup> (the blood brain barrier defends the brain against introduction of foreign substances and toxins; additionally, disruption can lead to brain edema<sup>6</sup>), constriction of blood vessels and impaired blood flow to the brain<sup>7</sup>, and triggering of autoimmune reactions<sup>8, 9</sup>. Following a large exposure, that depresses antioxidant defenses, magnifying vulnerability to future exposures, some persons no longer tolerate many other forms and intensities of electromagnetic radiation that previously caused them no problem, and that currently cause others no problem. But this group deserves – nay needs -- the right to be able to avoid these exposures.

**Affected individuals not only experience “symptoms”** that “merely” cause them distress and suffering, when they are exposed – symptoms like headaches<sup>10, 11</sup>, ringing ears<sup>10, 11</sup> and chest pain<sup>10</sup> from impaired blood flow, heart rhythm abnormalities<sup>10, 11</sup>, and inability to sleep<sup>10, 11</sup>. These symptoms arise from physiological injury. Moreover, **many experience significant health problems that can include seizures<sup>11</sup>, heart failure, hearing loss<sup>12, 14</sup> and severe cognitive impairment<sup>11, 15</sup>.** The mechanisms involved are those also involved in development and progression of neurodegenerative conditions including Alzheimer’s disease<sup>16</sup>.





**Fully half who were employed when their problems developed lost their job because of the problem**, among participants of a survey we conducted. They reported that their condition had cost them up to 2 million dollars to date. Many had lost their homes. A number became homeless, and have swelled the ranks of so-called "EMF refugees"<sup>17-19</sup>. Among those affected, many were previously high functioning individuals – engineers, doctors, lawyers. The best and the brightest are among those whose lives – and ability to contribute to society – will be destroyed. High profile individuals with acknowledged electrohypersensitivity include, for instance, Gro Harlem Brundtland – the former 3-time Prime Minister of Norway and former Director General of the World Health Organization<sup>20</sup>; Matti Niemela, former Nokia Technology chief<sup>21</sup>; as well as the wife of Frank Clegg<sup>22</sup>, who formerly headed Microsoft Canada and is current head of Canadians for Safe Technology<sup>23</sup>.

**Each new roll-out of electromagnetic technology for which exposure is obligatory, swells the ranks of those who develop problems with electromagnetic fields (EMF).** - particularly following a significant exposure to pulsed radiowave-microwave radiation, and particularly when people have no ability to avoid it.

**Many state that they didn't give credence to the problem (if they had heard of it at all) until they themselves fell prey to it.**

**This is not a psychologically driven condition.** Multiple objective physiological changes reflecting mechanisms of injury have been shown in persons with this condition<sup>24, 25</sup>.

**The role for oxidative stress, that has been shown in innumerable studies (below), is affirmed by evidence of a link of this condition to genetic variants in antioxidant defenses**, that are less avid in defending against oxidative stress<sup>307</sup>. People cannot manipulate their genes, to produce such an outcome by suggestibility.

**An analysis by a University of Washington researcher showed that most studies funded by industry reported failure to show physiological effects. However, most studies without such industry bias affirmed effects.** This is redolent of findings shown in medicine<sup>26</sup>, regarding which the former editor in chief of the BMJ (the British Medical Journal), Richard Smith, noted, based on findings of a study, "This {result} suggests that, far from conflict of interest being unimportant in the objective and pure world of science where method and the quality of data is everything, it is the main factor determining the result of studies."<sup>27</sup>. So where articles deny injury from nonionizing radiowave-microwave radiation, there is commonly a stake aligned with financial benefit from such denial.

**Those who are affected are in desperate need of protection by our elected officials.** They need creation of safe spaces and housing, and roadways to allow travel, not removal of any prospect of one; protection of local rights to make decisions - **not removal of any recourse or ability to avoid what injures them.** They are far more strongly in need of protections than a great many protected classes – their problems arose due to actions of others, against which they were given no control – *and can be reversed*, in most cases, if the assault on them is rolled back. Through no fault of their own, and in some cases against their will (e.g. before opt out was permitted with smart meters), they were subjected to an



exposure that has altered their lives as they knew them, and forced them – needlessly - to the margins of society.

**Let our focus be on safer, wired and well shielded technology – not more wireless.**

**This legislation, if passed, and the resulting unrestricted roll-out of this technology, will predictably and directly injure and disable a new group, and add depth of suffering to those already affected.**

**In other spheres we abridge freedoms to protect the vulnerable few.** We require that every schoolchild be vaccinated, supposedly to protect the vulnerable few who may not respond effectively to a vaccine. The need to protect the vulnerable group is deemed to be so great that it justifies the decision to abridge individual rights.

**In contrast, this bill seeks to abridge individual freedoms, and local rights, in the service of harming a vulnerable group, and creating a new one.**

(The common factor appears to be that in both cases, the direction is aligned with a powerful industry that influences political decisions.)

Luckily, no abridgment of individual rights and freedoms is required to protect, here.

**If any group can opt out (such as, I understand, firefighters\*)<sup>28</sup>; then every group deserves that equal right.** Others should not be second class citizens, subject to fewer protections.

It would go far to helping this cause if anyone complicit in promoting or passing the legislation (and then after that, *their* families) were required to be the first subjected, for a substantial test period, to the *greatest* amount of exposure that anyone *else* (and their families) may be subjected to, when new policies of this type are rolled out. It will still not do them equal damage; because they may not represent the vulnerabilities that others will have; but such a policy might help them to think twice. *That* is a bill I would strongly endorse.

**Most who are now affected – were not, until they were. This may become you – or your child or grandchild.** Moreover, if you have a child, or a grandchild, his sperm, or her eggs (all of which she will already have by the time she is a fetus in utero), will be affected by the oxidative stress damage created by the electromagnetic radiation, in a fashion that may affect your future generations irreparably.

It was noted above that, among survey completers, fully half of those who were employed at the time they developed electrosensitivity, lost employment *due to* this problem. (This may understate the scope of the tragedy, since this most-affected group may be least likely to be able to respond to an online survey.) **Many who previously had no problem navigating in the world are now restricted from access to basic services** like hospital care, post offices and libraries because of these problems. With each new introduction of technology that exposes many to yet a new nondiscretionary source of electromagnetic radiation, particularly (but not exclusively) that which emits pulsed radiation in the radiowave-microwave part of the spectrum, a new group of people are affected; and the suffering of those who are already affected increases greatly.



Please, defend the public and our future. Protect the rights of the individual and the locality, against a form of incursion that will lead to serious harm to some – and set a terrible precedent. **Vote no on California SB 649**, and urge that everyone else do the same.

Sincerely,

Beatrice Alexandra Golomb, MD, PhD  
 Professor of Medicine  
 UC San Diego School of Medicine

\*Comment on the fire fighter exemption: "The legislature granted an exemption from SB 649 to the firefighters who requested it for health reasons. Throughout California firefighters have long complained of often disabling symptoms from cell towers on their stations. Cities frequently rent out space on fire stations to add to city revenue. ...Symptoms experienced by the firefighters have included neurological impairment including severe headache, confusion, inability to focus, lethargy, inability to sleep, and inability to wake up for 911 emergency calls. Firefighters have reported getting lost on 911 calls in the same community they grew up in, and one veteran medic forgot where he was in the midst of basic CPR on a cardiac victim and couldn't recall how to start the procedure over again...Prior to the installation of the tower on his station, this medic had not made a single mistake in 20 years. A pilot study (2004) of California firefighters showed brain abnormalities, cognitive impairment, delayed reaction time, and lack of impulse control in all 6 firefighters tested (<https://ecfsapi.fec.gov/file/7022117660.pdf>). This study led to the overwhelming passage of Resolution 15 by the International Association of Firefighters in Boston in August 2004. Res. 15 called for further study and was amended to impose a moratorium on the placement of cell towers on fire stations throughout the US and Canada."<sup>15 28</sup>

Clearly, others who experience similar problems also deserve protections.

#### Optional – More on the Science

There is a robust literature showing that electromagnetic radiation, including in nonionizing frequencies, and at levels<sup>29,30</sup> below those that are cause thermal effects (heating) – causes physiological effects, injury, and cell death –not only in humans but many animals and plants<sup>3, 7, 31-49</sup>. Unsurprisingly, industry has sought – against the tide of evidence to the contrary - to maintain that radiation must be ionizing or heating to cause injury.

Scores or hundreds of studies show that radiation, including specifically radiowave-microwave spectrum radiation, and including low-level exposure, can impair antioxidant defenses, increase "oxidative stress" (free radical injury) and damage mitochondria, the energy producing parts of cells<sup>1, 2, 34, 50-6930, 70-104105-13646, 137-171</sup>. These effects occur with ionizing and nonionizing radiation, at thermal and subthermal levels. (Indeed, much or most of the damage by ionizing radiation, and radiation above the thermal limit, occurs by mechanisms also documented to occur without ionization, and below the thermal limit.) These





mechanisms cohere with the mechanisms documented to play a role in symptoms and health conditions that are reported in those who are electrosensitive – extending to seizures<sup>172-176</sup>, heart failure<sup>177-184</sup> and cognitive decline<sup>5, 32, 57, 108, 185-195</sup>.

**These mechanisms have known involvement in induction of brain cancer, metabolic diseases like obesity and diabetes, autism, autoimmune disease, and neurodegenerative conditions,** conditions that have exploded. In each case these have been linked, or presumptively linked, in some studies to electromagnetic radiation<sup>8, 9, 16, 34, 196-219</sup>.

**Such radiation also has effects on sperm**<sup>33, 100, 220-228</sup>; and the DNA of sperm<sup>229</sup> (consistent with recent news reports of marked recent declines in sperm counts and function)..

**Such radiation also has toxic effects in pregnancy**<sup>230</sup>, to the fetus and subsequent offspring<sup>231-235</sup> including at low levels<sup>236</sup>, and is tied to developmental problems in later life, including attention deficit and hyperactivity<sup>31, 235-241</sup>. It is critical to defend pregnant women (and eggs of girls who may at a later time become pregnant) from exposures with such toxicity.

**Electromagnetic radiation across much or most of the spectrum (not excluding visible light) has been shown to depress levels of melatonin**<sup>40, 72, 242-252</sup>, which is best known for its role in sleep (and indeed, impaired sleep is the most consistent symptom in affected individuals<sup>10, 11</sup>).

**Melatonin is in fact a critical antioxidant that defends the body against harm from many toxic exposures**<sup>253-266</sup> including electromagnetic radiation itself<sup>61, 66, 67, 82, 101, 107, 118, 121, 138, 144, 151, 204, 249, 267-284</sup> - reducing the oxidative stress that is implicated in cancer, metabolic diseases like obesity and diabetes, autism, autoimmune disease, bipolar disorder and neurodegenerative conditions, and that also plays a role in heart attack and stroke<sup>9, 285-329, 330-343</sup>.

**Radiation, and specifically radiation in the radiowave-microwave portion of the spectrum can also depress levels of other critical antioxidant systems** that also defend the body against chemical, radiation, and other sources of injury. These other antioxidant systems include the glutathione system, superoxide dismutase and catalase<sup>81, 102, 115, 116, 233, 344-358</sup> - which are also involved in defending against health problems.

**This suggests that depression of antioxidant defenses due to electromagnetic radiation may magnify risk of chemically induced health effects (and depression of antioxidant systems due to some chemicals may amplify risk of harm from electromagnetic radiation).** Indeed just such effects have been reported<sup>359, 360</sup>.

Rec'd at Meeting 12/10/19  
Item No. 3.1  
From: Kim Schroeder

Testimony To Santa Rosa City Officials

My name is Kim Schroeder, I am a Santa Rosa native and resident. I attest and affirm that the following statements are true, accurate and within my personal knowledge.

Regarding Slide 17 (Exhibit A, attached): Here are the solutions to protect Santa Rosans' health, safety, property, environment and history from so-called "small cells" (hereinafter wireless telecommunications facilities (WTFs)). An ordinance must include both City-owned Light Poles and PG&E Utility Poles.

WTFs irradiate, block the landscape and skyline, and disallow healthy, private living. As such, they cannot lawfully be placed within 1,500 feet of sensitive areas, including without limitation residential and school zones, senior centers, health care facilities, playgrounds, and parks. A detailed list of preferred or disfavored locations is included in the attached recommended revisions to Santa Rosa's telecommunications ordinance. A few examples include:

- All WTFs require a Conditional Use Permit
- Notify all property owners within 1,500 feet of the proposed installation within 14 days of public hearing
- 1,500 foot Setback from other small cell installations
- Radiofrequency Data Report Requirement
- ADA Compliance Requirement
- General Liability Insurance in the amount of \$ 2-5 million to protect the City of Santa Rosa, obtained, paid for and maintained by the permittee

Per the last item, note that the reinsurance and insurance industries have refused to insure the wireless communications industry for 4G and 5G technology.

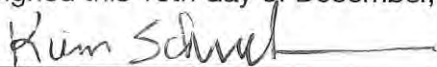
When allowed in commercial or industrial zones, WTFs must comply with City Code 20.44, and their Effective Radiating Power (ERP) must be limited by means of protective fuses to 0.04W, such limit as allows carriers to provide more than adequate coverage but not irradiate at maximum capacity. The protective fuses are of nominal cost and will earn the City considerable income from violations of this ERP limit.

The Telecommunications Act of 1996 (TCA) does not preempt local authorities from regulating the operations of WTFs: indeed, it requires them to do so. Any refusal to regulate as City officials are obligated to do, and any misrepresentation such as a false denial of the existence of authority renders an official ultra vires.

The best solution for any city is Fiber to the Premises (FTTP). Fiber-optic cable is the most energy-efficient, expedient, reliable, secure, safe and democratic way to offer broadband service. With fiber, individual households can choose whether they want to run wireless in their homes via Wi-Fi or not. Santa Rosa would use the fiber-optic cable that we've already paid for through our phone bills as the starting point, which the wireless industry uses free of charge.

I have expressed no "concern" or any other nonsubstantive matter, but solely matters of fact and law. I accept your oath of office.

Signed this 10th day of December, 2019



Kim Schroeder  
1892 Bennett Meadows Ln  
Santa Rosa, CA 95405

## **Recommended revisions and safeguards necessary to protect the City of Santa Rosa and the public interest of residents: Telecommunications Ordinance**

- All wireless facilities, whether small cells, cell towers, or other wireless telecommunications facilities (WTFs) require a Conditional Use Permit by the planning department followed by an encroachment permit. Notices in either in newspaper, website no less than 14 days prior to the date of the hearing.
- Notification of all property owners within 1,500 feet of the proposed installation within 14 days of public hearing.
- 1,500 Foot Setback from other small cell installations: Every effort shall be made to locate small cell installations no less than 1,500 feet away from the Permittee's or any Lessee's nearest other small cell installation, or within 1,500 feet of any permanent residential dwelling. Examples of setbacks between small cells (SCF): Calabasas, Petaluma, Fairfax, Mill Valley, Marin County, and San Ramon (all California jurisdictions) require 1,500 feet between SCFs.
- Radiofrequency Data Report Requirement: Have a thorough radiofrequency data requirement as part of the submittal for consultants. For all applications require that both an RF Compliance Report signed by a registered Professional Engineer, and a supporting RF is mandatory.
- Preferred or Disfavored Locations: In addition to residential areas, designate areas where cell towers are disfavored and not permitted, i.e. near schools/colleges, senior centers, health care facilities, day care facilities, city buildings, sensitive habitats, on ridge lines, public parks, Historic Overlay Districts, in open spaces or where they are favored i.e. commercial zoning areas, industrial zoning areas.
- Disfavored Location: Every effort should be made to avoid placement of small cell installations in close proximity to residences, particularly from sleeping and living areas. Viable and defensible setbacks will vary based on zoning.
- Prohibited Zones for Small Cells: Prohibits small cell telecommunication facilities in residential zones and multi-family zoning districts (Mill Valley, Petaluma, Marin County).
- General Liability Insurance \$ 2-5 million to protect the City of Santa Rosa: The permittee shall obtain, pay for and maintain, in full force and effect until the facility approved by the permit is removed in its entirety from the public right-of-way, an insurance policy or policies of commercial general liability insurance, with minimum limits of Two Million Dollars (\$2,000,000) for each occurrence and Four Million Dollars (\$4,000,000) in the aggregate, that fully protects the City from claims and suits for boards, commissions, officers, officials, agents, consultants, employees and volunteers as additional named insureds, be issued by an insurer admitted in the State of California with a rating of at least a A:VII in the latest edition of A.M. Best's Insurance Guide, and include an endorsement providing that the policies cannot be canceled or reduced except with thirty (30) days prior written notice to the city, except for cancellation due to nonpayment of premium. (Note the reinsurance and insurance industry has refused to insure the wireless communications industry for 4G and 5G technology. )
- Authorization from Property Owner: If the facility will be located on or in the property of someone other than the owner of the facility (such as a street light pole, street signal pole, utility pole, utility cabinet, vault, or cable conduit), the applicant shall provide a duly executed written authorization from the property owner(s) authorizing the placement of the facility on or in the property owner's property.
- Community Meeting: The applicant would be required to hold a community meeting at least two weeks prior to the planning commission hearing on the use permit.
- FCC Clause: Have a clause voiding the agreement with the telecommunications company (permittee) or requiring modification in the event of a regulatory change (overturning the current FCC Orders).

- Significant Gap in coverage: Maintain requirement for significant gap in coverage to be identified for approval of both small cells and cell towers. Independent wireless consultant shall be retained by the City, paid for by the Permittee to establish whether there exists a significant gap in coverage.
- Least Intrusive Methods: Maintain requirement for the least intrusive methods to fill the gap for both small cells and cell towers. A justification study which includes the rationale for selecting the proposed use; if applicable, a detailed explanation of the coverage gap that the proposed use would serve; and how the proposed use is the least intrusive means for the applicant to provide wireless service. Said study shall include all existing structures and/or alternative sites evaluated for potential installation of the proposed facility and why said alternatives are not a viable option. (Old-Palos Verdes)
- Require Mock-up: Require full-size mock-up of proposed SCFs and other pertinent information in order to adequately consider the same potential impacts. It also may want to adopt Larkspur's approach to require construction drawings, a site survey, and photo simulations. (Boulder, CO Report )
- Drip line of tree/heritage trees: No facility shall be permitted to be installed in the drip line of any tree in the right-of-way.... (Old-Palos Verdes)
- Speculative Equipment Prohibited. Prohibit the practice of "pre-approving" wireless equipment or other improvements that the applicant does not presently intend to install but may wish to install at some undetermined future time does not serve the public's best interest. The City shall not approve any equipment or other improvements in connection with an existing Wireless Telecommunications Facility.
- Americans with Disabilities Act (ADA) Compliance. All facilities shall be in compliance with the Americans with Disabilities Act (ADA).
- Noise Complaints: If a nearby property owner registers a noise complaint, the city shall forward the same to the permittee. Said complaint shall be reviewed and evaluated by the applicant. The permittee shall have ten (10) business days to file a written response regarding the complaint, which shall include any applicable remedial measures. If the city determines the complaint is valid and the applicant has not taken any steps to minimize the noise, the city may hire a consultant to study, examine and evaluate the noise complaint and the permittee shall pay the fee for the consultant if the site is found in violation of this chapter. The matter shall be reviewed by the Director of PRMD. If the director determines sound proofing or other sound attenuation measures should be required to bring the project into compliance with the Code, the director may impose conditions on the project to achieve said objective. (Old- Palos Verdes)
- Endangerment, interference: No person shall install, use or maintain any facility which in whole or in part rests upon, in or over any public right-of-way, when such installation, use or maintenance endangers or is reasonably likely to endanger the safety of persons or property, or when such site or location is used for public utility purposes, public transportation purposes or other governmental use, or when such facility unreasonably interferes with or unreasonably impedes the flow of pedestrian or vehicular traffic including any legally parked or stopped vehicle, the ingress into or egress from any residence or place of business, the use of poles, posts, traffic signs or signals, hydrants, mailboxes, permitted sidewalk dining, permitted street furniture or other objects permitted at or near said location.
- Independent Expert. The City is authorized to retain on behalf of the city an independent, qualified consultant to review any application for a permit for a wireless telecommunications facility. The review is intended to be a review of technical aspects of the proposed wireless telecommunications facility and shall address all aspects of the County's telecommunications ordinance.
- Annual Recertification: Each year, commencing on the first anniversary of the issuance of the permit, the Permittee shall submit to the City an affidavit which shall list all active small cell wireless installations it owns within the City by location, certifying that (1) each active small cell installation is covered by liability insurance in the amount of \$2,000,000 per installation, naming the City as additional insured; and (2) each active installation has been inspected for safety and found to be in sound working condition and in compliance with all federal safety regulations concerning RF exposure limits applicable at the time.
- Random Testing for RF Compliance: The City shall have the right to employ a qualified RF engineer to conduct at least annual random and unannounced testing of the Permittee's small cell wireless installations



located within the County to certify their compliance with all current FCC radio-frequency emission limits as they pertain to exposure to the general public. The reasonable cost of such tests shall be paid by the Permittee. The FCC's RF emissions standards and regulations may be revised in the future. The proposed measure would ensure that wireless telecommunications facilities are not locked in to outdated emissions standards or FCC regulations.

- **Violation of compliance Notification:** In the event that such independent tests reveal that any small cell installation or installations owned or operated by Permittee or its Lessees, singularly or in the aggregate, is emitting RF radiation in excess of FCC exposure guidelines as they pertain to the general public, the City shall notify the Permittee and all residents living within 1500 feet of the small cell installation(s) of the violation, and the Permittee shall have forty-eight (48) hours to bring the small cell installation(s) into compliance. There will be a \$500,000 Compliance Bond, failure to bring the small cell installation(s) into compliance shall result in the forfeiture of all or part of the Compliance Bond, and the City shall have the right to require the removal of such installation(s), as the City in its sole discretion may determine is in the public interest.
- **Non-acceptance of Applications:** Where such annual re-certification has not been properly or timely submitted, or equipment no longer in use has not been removed within the required 30-day period, no further applications for small cell wireless installations will be accepted by the City until such time as the annual re-certification has been submitted and all fees and fines paid.
- **Fall Zone:** The proposed small cell installation shall have an adequate fall zone to minimize the possibility of damage or injury resulting from pole collapse or failure, ice fall or debris fall, and to avoid or minimize all other impacts upon adjoining property
- **Aesthetics and Undergrounding:** All equipment not to be installed on or inside the pole must be located underground, flush to the ground, within three (3) feet of the utility pole. Each installation is to have its own dedicated power source to be installed and metered separately.
- **For any Close Proximity Microwave Radiation Antennas (CPMRA) Wireless Telecommunications Facility (WTF) that is installed in the public rights-of-way, or attached to any building, or has antennas installed at height that is lower than 100 feet off the ground, the applicant must install only antennas, radios and supporting equipment that have no chance of exceeding a total of 40 milliwatts of effective radiated power from all of the equipment operating at or connected to this specific WTF."**

The City will do this to protect the quiet enjoyment of the City of Santa Rosa streets and to protect from negative health consequences and safety concerns -- which are all considered aesthetic considerations, according to the CA Supreme Court. --> <https://scientists4wiredtech.com/2019-ca-supreme-court-decision-t-mobile-v-san-francisco/>

A side benefit of this regulations is that the maximum of 40 milliwatts of effective radiated power per CPMRA enables Telecommunications Service up to around 2,500 feet from the CPMRA (twice the industry-claimed desired distance), is within the Bioinitiative RF-EMR exposure guidelines and is compliant with the FCC RF-EMR exposure guidelines.

Wireless Telecommunications Facilities (WTFs) with cellular antennas of any size or shape need sufficient vertical and horizontal setbacks from where people live, sleep and heal. Installing antennas 25-50 feet off the ground and closer than 1,500 feet to residences harms residents' safety, privacy and property values.

Many are familiar with 50/50 solutions to problems, but any town has the opportunity to adopt a 150/150 solution:

- Any town could require that WTF antennas be installed only on private, applicant-owned poles that have antennas installed no lower than 150 feet higher than the highest roof within a 1,500 foot radius of any WTF.
- Any town could require that the applicant only install equipment that has no chance of outputting Effective Radiated Power any higher than 150 milliWatts (0.15 Watts) from the face of the antenna shroud.

- **Aesthetic Requirements:** The following aesthetic considerations should be included in the revised Telecommunications Ordinance
  - "Size of antennas, equipment boxes, and cabling;
  - Painting of attachments to match mounting structures;
  - Use of shrouds, stealth techniques, or other camouflage;
  - Flush-mounting of antennas;
  - Placement of equipment in the pole base rather than on the outside of the pole;
  - Consistency with the character of historic neighborhoods;
  - Minimum spacing between attachments;" and
  - Aesthetic standards for residential neighborhoods, including "any minimum setback from dwellings, parks, or playgrounds and minimum setback from dwellings, parks, or playgrounds; maximum structure heights; or limitations on the use of small, decorative structures as mounting locations."

Kim Schroeder, Resident of Santa Rosa, CA  
To: Santa Rosa City Council  
RE:12/10/19 Santa Rosa City Council agenda item 3.1- WIRELESS SMALL CELL  
DEPLOYMENT ON CITY OWNED STREET LIGHTS AND JOINT UTILITY POLES  
**Addendum**

Exhibit A

**Solutions**

**City Owned Poles**

**• Limited deployment for each provider (maximum of 6 locations) • Deployments in non-residential areas only**

- Increase transparency and improve educational materials
  - Map portal
  - Access to studies (RF)
  - Improved notification and community engagement
- Align code sections and telecommunications policy
- Improve emergency alerting
- Develop solutions for aesthetic concerns
- Allow additional location flexibility

Rec'd at Meeting 12/10/19  
Item No. 3.1  
From: Maxwell Krohn

Maxwell Krohn, Resident of Santa Rosa, CA

To: Santa Rosa City Council

RE:12/10/19 Santa Rosa City Council agenda item 3.1- WIRELESS SMALL CELL DEPLOYMENT ON  
CITY OWNED STREET LIGHTS AND JOINT UTILITY POLES


I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Maxwell Krohn and I live in the City of Santa Rosa.

Consistent evidence from epidemiology in vivo (animal) toxicology and in vitro (cell) laboratory studies shows that RF/microwave radiation exposure is respectively associated with and causal to produce reduced sperm count, motility and concentration, as well as DNA damage and altered cell structure. Research also shows damage after wireless exposure to the ovaries of rats and mice, as well as harm to the eggs of flies and birds, and overall degradation of fertility capacity over just a few generations. Decades of such studies have produced an enormous volume of data constituting proof of harm to humans, animals and plants, particularly where radiation is modulated for data carriage.

I have expressed no "concern" or any other non-substantive matter, but solely matters of fact and law. I accept your oath of office.

Signed December 10<sup>th</sup>, 2019

Maxwell Krohn

  
maxkrohn@rc@gmail.com



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- [Published: 09 December 2018](#)

## Radiations and male fertility

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- [Ralf Henkel<sup>2</sup>](#)

*Reproductive Biology and Endocrinology* volume 16, Article number: 118 (2018) [Cite this article](#)

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## Abstract

During recent years, an increasing percentage of male infertility has to be attributed to an array of environmental, health and lifestyle factors. Male infertility is likely to be affected by the intense exposure to heat and extreme exposure to pesticides, radiations, radioactivity and other hazardous substances. We are surrounded by several types of ionizing and non-ionizing radiations and both have recognized causative effects on spermatogenesis. Since it is impossible to cover all types of radiation sources and their biological effects under a single title, this review is focusing on radiation deriving from cell phones, laptops, Wi-Fi and microwave ovens, as these are the most common sources of non-ionizing radiations, which may contribute to the cause of infertility by exploring the effect of exposure to radiofrequency radiations on the male fertility pattern. From currently available studies it is clear that radiofrequency electromagnetic fields (RF-EMF) have deleterious effects on sperm parameters (like sperm count, morphology, motility), affects the role of kinases in cellular metabolism and the endocrine system, and produces genotoxicity, genomic instability and oxidative stress. This is followed with protective measures for these radiations and future recommendations. The study concludes that the RF-EMF may induce oxidative stress with an increased level of reactive oxygen species, which may lead to infertility. This has been concluded based on available evidences from in vitro and in vivo studies suggesting that RF-EMF exposure negatively affects sperm quality.

## Introduction: History and sources of microwaves

Radiation can be characterized into ionizing and non-ionizing radiations, of which the latter is differentiated in two forms: 1) extremely low frequency (ELF) or power line (60 Hz) electromagnetic fields (EMFs), and 2) radio frequency (RF) EMFs - which are produced by wireless radio waves/microwaves products.

The biological effects of microwave radiations effectively begin with the development of radar early during World War II. No harmful effects of microwaves were detected prior to this time and are also not in the list of a

## Keywords

Proteome Mobile phone Electromagnetic Male-mediated teratogen  
Blood-testis-barrier Heat-shock proteins  
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## Notes

### Compliance with ethical standards

### Conflict of interest

The authors declare that they have no conflict of interest.

### Research involving human participants and/or animals

This article does not contain any studies with human participants or animals performed by any of the authors.

### Informed consent

Due to the nature of review paper, no informed consent was available.

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## Effect of mobile telephones on sperm quality: a systematic review and meta-analysis.

Review article

Adams JA, et al. *Environ Int.* 2014.

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### Abstract

Mobile phones are owned by most of the adult population worldwide. Radio-frequency electromagnetic radiation (RF-EMR) from these devices could potentially affect sperm development and function. Around 14% of couples in high- and middle-income countries have difficulty conceiving, and there are unexplained declines in semen quality reported in several countries. Given the ubiquity of mobile phone use, the potential role of this environmental exposure needs to be clarified. A systematic review was therefore conducted, followed by meta-analysis using random effects models, to determine whether exposure to RF-EMR emitted from mobile phones affects human sperm quality. Participants were from fertility clinic and research centres. The sperm quality outcome measures were motility, viability and concentration, which are the parameters most frequently used in clinical settings to assess fertility. We used ten studies in the meta-analysis, including 1492 samples. Exposure to mobile phones was associated with reduced sperm motility (mean difference -8.1% (95% CI -13.1, -3.2)) and viability (mean difference -9.1% (95% CI -18.4, 0.2)), but the effects on concentration were more equivocal. The results were consistent across experimental in vitro and observational in vivo studies. We conclude that pooled results from in vitro and in vivo studies suggest that mobile phone exposure negatively affects sperm quality. Further study is required to determine the full clinical implications for both sub-fertile men and the general population.

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PMID: 24927498 [Indexed for MEDLINE]

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## Challenging cell phone impact on reproduction: a review.

Review article

Merhi ZO. J Assist Reprod Genet. 2012.

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### Abstract

**PURPOSE:** The radiofrequency electromagnetic radiation (RF-EMR) produced by cell phones can enhance the excitability of the brain and has recently been classified as carcinogenic. The suggested use of hands-free kits lowers the exposure to the brain, but it might theoretically increase exposure to the reproductive organs. This report summarizes the potential effects of RF-EMR on reproductive potentials in both males and females.

**METHODS:** A critical review of the literature pertaining to the impact of cell phone RF-EMR on reproduction in male and female animals and humans was performed, with a focus on gonad metabolism, apoptosis of reproductive cells, fertility status, and serum reproductive hormones.

**RESULTS:** While some animal and human studies revealed alterations in reproductive physiology in both males and females, others did not report any association. The in vitro and in vivo studies to date are highly diverse, very inconsistent in conduct and, in many cases, report different primary outcomes.

**CONCLUSION:** The increasing use of cell phone warrants well-designed studies to ascertain the effect of their RF-EMR on reproduction.

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Effects of the exposure to mobile phones on male reproduction: a review of the literature.

Review article

La Vignera S, et al. J Androl. 2012.

# Effect of electromagnetic field exposure on the reproductive system

Myung Chan Gye and Chan Jin Park

## Abstract

The safety of human exposure to an ever-increasing number and diversity of electromagnetic field (EMF) sources both at work and at home has become a public health issue. To date, many *in vivo* and *in vitro* studies have revealed that EMF exposure can alter cellular homeostasis, endocrine function, reproductive function, and fetal development in animal systems. Reproductive parameters reported to be altered by EMF exposure include male germ cell death, the estrous cycle, reproductive endocrine hormones, reproductive organ weights, sperm motility, early embryonic development, and pregnancy success. At the cellular level, an increase in free radicals and  $[Ca^{2+}]_i$  may mediate the effect of EMFs and lead to cell growth inhibition, protein misfolding, and DNA breaks. The effect of EMF exposure on reproductive function differs according to frequency and wave, strength (energy), and duration of exposure. In the present review, the effects of EMFs on reproductive function are summarized according to the types of EMF, wave type, strength, and duration of exposure at cellular and organism levels.

**Keywords:** Electromagnetic field, Reproduction

## Introduction

Humans in modern society are exposed to an ever-increasing number of electromagnetic fields (EMFs) generated from the production and supply of electricity, television (TV) sets, personal computer (PC), radio communication, and mobile communication. Since the 1960s, when the biological hazard of EMF exposure was studied in the Soviet Union, the safety of humans exposed to EMFs both at home and during occupational activities has become an important issue in public health. The biological effect of EMFs is currently under debate and still a controversial issue. In the present review, the effects of EMFs on reproductive function are summarized according to the types of EMFs and duration of exposure at the cellular and organism levels.

## Types of EMF and frequency of exposure

Humans in modern society are exposed to various kinds of EMFs. Extremely low frequency (ELF)-EMFs have 3 to 30 Hz frequencies and are generated from military communication. The EMFs to which humans are most frequently exposed are the 50 to 60 Hz super low frequency (SLF) EMFs generated from power cables for industrial and household electrical supplies and electronic goods. Very low frequency (VLF) EMFs with 3 to 30 kHz frequency are generated from PC monitors or TV sets. EMFs from TVs or PCs have a 6.25  $\mu$ T intensity with a 20 kHz frequency [1]. The radio frequency (RF) EMFs generated from mobile phones, cordless phones, and broadcasting towers have frequencies of hundreds of MHz. All these EMFs are non-ionizing radiation, which do not have energy to release electrons from orbit. EMFs have a wave character in short frequency and act as a magnetic field in long frequency. The strength of the electric field and magnetic field is measured in units of kV/m and  $\mu$ T, respectively. Household electronic goods can produce a 4  $\mu$ T EMF and EMF ranges from 0.01 to 1  $\mu$ T inside and outside of house [2]. The strength of SLF-EMFs is dependent on the electrical current and distance from the conductor. Therefore, SLF-EMFs are the highest near the power cable and decrease rapidly by distance.

## Cellular mechanism for EMF induced toxicity

At the cellular level, an increase in free radicals and  $[Ca^{2+}]_i$  may mediate the effect of EMFs and lead to cell growth inhibition, protein misfolding, and DNA breaks. EMFs can disrupt  $Ca^{2+}$ -dependent cell signaling. How does EL-EMF exposure affect signal transduction in cells? In human leukemia T-cell line Jurkat cells, a 50 Hz, 0.5 mT EMF was found to increase  $Ca^{2+}$  levels, blocking the effect of cholera toxin and the protein tyrosine kinase inhibitor genistein [3]. In thymic lymphocytes,  $Ca^{2+}$  influx increased during mitogen-activated signal transduction when exposed to a 60 Hz, 22 mT EMF [4], suggesting the modulating role of EMF on

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## **Pathophysiology of cell phone radiation: oxidative stress and carcinogenesis with focus on male reproductive system.**

### **Review article**

Desai NR, et al. *Reprod Biol Endocrinol*. 2009.

[Show full citation](#)

### **Abstract**

Hazardous health effects stemming from exposure to radiofrequency electromagnetic waves (RF-EMW) emitted from cell phones have been reported in the literature. However, the cellular target of RF-EMW is still controversial. This review identifies the plasma membrane as a target of RF-EMW. In addition, the effects of RF-EMW on plasma membrane structures (i.e. NADH oxidase, phosphatidylserine, ornithine decarboxylase) and voltage-gated calcium channels are discussed. We explore the disturbance in reactive oxygen species (ROS) metabolism caused by RF-EMW and delineate NADH oxidase mediated ROS formation as playing a central role in oxidative stress (OS) due to cell phone radiation (with a focus on the male reproductive system). This review also addresses: 1) the controversial effects of RF-EMW on mammalian cells and sperm DNA as well as its effect on apoptosis, 2) epidemiological, in vivo animal and in vitro studies on the effect of RF-EMW on male reproductive system, and 3) finally, exposure assessment and dosimetry by computational biomodeling.

PMID: 19849853 [Indexed for MEDLINE]

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Effects of radiofrequency electromagnetic waves (RF-EMW) from cellular phones on human ejaculated semen: an in vitro pilot study.

Agarwal A, et al. *Fertil Steril*. 2009.

Are men talking their reproductive health away?

Agarwal A, et al. *Asian J Androl*. 2015.



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## Effects of electromagnetic waves emitted from 3G+wi-fi modems on human semen analysis.

Kamali K, et al. Urologia. 2017.

[Show full citation](#)

### Abstract

**OBJECTIVE:** The purpose of this study was to evaluate the effects of 3G+wifi modems on human sperm quality. A total of 40 semen specimens were gathered between March and September 2015, from healthy adult men.

**METHODS:** The sperm samples were divided into two groups - 3G+wi-fi exposed and unexposed groups. In the unexposed group, the specimens were shielded by aluminum foil in three layers and put into an incubator at a temperature of 37°C for 50 minutes. The exposed group was positioned in another room in an incubator at a temperature of 37°C for 50 minutes. A 3G+wi-fi modem was put into the same incubator and a laptop computer was connected to the modem and was downloading for the entire 50 minutes. Semen analysis was done for each specimen and comparisons between parameters of the two groups were done by using Kolmogorov-Smirnov study and a paired t-test.

**RESULTS:** Mean percentage of sperm with class A and B motility were not significantly different in two groups ( $p = 0.22$  and  $0.54$ , respectively). In class C, it was significantly lower in the exposed group ( $p = 0.046$ ), while in class D it was significantly higher ( $p = 0.022$ ). Velocity curvilinear, velocity straight line, velocity average path, mean angular displacement, lateral displacement and beat cross frequency were significantly higher in the unexposed group. The limitation was the in vitro design.

**CONCLUSIONS:** Electromagnetic waves (EMWs) emitted from 3G+wi-fi modems cause a significant decrease in sperm motility and velocity, especially in non-progressive motile sperms. Other parameters of semen analysis did not change significantly. EMWs, which are used in communications worldwide, are a suspected cause of male infertility. Many studies evaluated the effects of cell phones and wi-fi on fertility. To our knowledge, no study has yet been done to show the effects of EMWs emitted from 3G+wi-fi modems on fertility. Our study revealed a significant decrease in the quality of human semen after exposure to EMWs emitted from 3G+wi-fi modems.

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## **Oxidative effects of extremely low frequency magnetic field and radio frequency radiation on testes tissues of diabetic and healthy rats.**

Kuzay D, et al. Bratisl Lek Listy. 2017.


[Show full citation](#)

### **Abstract**

With the development of technology, people are increasingly under the exposure of electromagnetic fields. Individuals with chronic diseases such as diabetes are now long-term exposed to Radio Frequency-RF radiation and extremely low frequency (ELF) magnetic fields (MFs). The purpose of this present study is to investigate oxidative effects and antioxidant parameters of ELF MFs and RF radiation on testis tissue in diabetic and healthy rats. Wistar male rats were divided into 10 groups. Intraperitoneal single dose STZ (65 mg/kg) dissolved in citrate buffer (0.1M (pH 4.5)) was injected to diabetes groups. ELF MFs and RF radiation were used as an electromagnetic exposure for 20 min/day, 5 days/week for one month. Testis tissue oxidant malondialdehyde (MDA), and antioxidants glutathione (GSH), and total nitric oxide (NOx) levels were determined. The results of ANOVA and Mann-Whitney tests were compared;  $p < 0.05$  was considered significant. ELF and RF radiation resulted in an increase in testicular tissue MDA and NOX levels ( $p < 0.05$ ), and caused a decrease in GSH levels ( $p < 0.05$ ) in both healthy and diabetic rats, yet more distinctively in diabetic rats. The most pronounced effect was recorded in D-RF + ELF group ( $p < 0.005$ ). Both radiation practices increased the oxidative stress in testis tissue while causing a decrease in antioxidant level which was more distinctive in diabetic rats (Tab. 1, Fig. 3, Ref. 30).

PMID: 28516790 [Indexed for MEDLINE]

### **Full text**

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### **Similar articles**

900 MHz pulse-modulated radiofrequency radiation induces oxidative stress on heart, lung, testis and liver tissues.

# Exposure to radiofrequency radiation emitted from mobile phone jammers adversely affects the quality of human sperm

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## ABSTRACT

**Background:** The health effect of rapidly increasing everyday exposure of humans to radiofrequency radiation is a major global concern. Mobile phone jammers prevent the mobile phones from receiving signals from base stations by interfering with authorized mobile carriers' services. In spite of the fact that mobile jammer use is illegal, they are occasionally used in offices, shrines, conference rooms and cinemas. *The purpose of this study was to investigate the biological effects of short term exposure of human sperm to radiofrequency radiation emitted from a commercial mobile phone jammer.*

**Materials and Methods:** Fresh semen samples were obtained by masturbation from 50 healthy donors who had referred with their wives to Infertility Treatment Center at the Mother and Child Hospital, Shiraz University of Medical Sciences. Female problem was diagnosed as the reason for infertility in these couples. The semen sample of each participant was divided into 4 aliquots. The first aliquot was subjected to *swim-up* and exposed to jammer radiation. The second aliquot was not subjected to *swim-up* but was exposed to jammer radiation. The third and fourth aliquots were not exposed to jammer radiation but only the 3<sup>rd</sup> aliquot was subjected to *swim-up*.

**Results:** Semen samples exposed to radiofrequency radiation showed a significant decrease in sperm motility and increase in DNA fragmentation.

**Conclusion:** Electromagnetic radiation in radiofrequency range emitted from mobile phone jammers may lead to decreased motility and increased DNA fragmentation in human semen. It can be concluded that mobile phone jamming might exert adverse reproductive health effects.

**Keywords:** Mobile phone jammers, sperm motility, DNA fragmentation, EMFs, microwave, RF, reproductive health.

## ► Original article

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## INTRODUCTION

Infertility is a relatively common disorder<sup>(1)</sup> affecting 10-15% of American couples and 20%

of couples at reproductive age worldwide. Modern life has prompted humans to generate, transmit and use more electricity and now electricity is an essential component of the life in

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## **Pulsed or continuous electromagnetic field induce p53/p21-mediated apoptotic signaling pathway in mouse spermatogenic cells in vitro and thus may affect male fertility.**

Solek P, et al. *Toxicology*. 2017.

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### **Abstract**

The impact of electromagnetic field (EMF) on the human health and surrounding environment is a common topic investigated over the years. A significant increase in the electromagnetic field concentration arouses public concern about the long-term effects of EMF on living organisms associated with many aspects. In the present study, we investigated the effects of pulsed and continuous electromagnetic field (PEMF/CEMF) on mouse spermatogenic cell lines (GC-1 spg and GC-2 spd) in terms of cellular and biochemical features in vitro. We evaluated the effect of EMF on mitochondrial metabolism, morphology, proliferation rate, viability, cell cycle progression, oxidative stress balance and regulatory proteins. Our results strongly suggest that EMF induces oxidative and nitrosative stress-mediated DNA damage, resulting in p53/p21-dependent cell cycle arrest and apoptosis. Therefore, spermatogenic cells due to the lack of antioxidant enzymes undergo oxidative and nitrosative stress-mediated cytotoxic and genotoxic events, which contribute to infertility by reduction in healthy sperm cells pool. In conclusion, electromagnetic field present in surrounding environment impairs male fertility by inducing p53/p21-mediated cell cycle arrest and apoptosis.

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Solek P, et al. *Environ Res*. 2018.

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## **Radiofrequency electromagnetic radiation from cell phone causes defective testicular function in male Wistar rats.**

Oyewopo AO, et al. *Andrologia*. 2017.

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### **Abstract**

Cell phones have become an integral part of everyday life. As cell phone usage has become more widespread, concerns have increased regarding the harmful effects of radiofrequency electromagnetic radiation from these devices. The current study was undertaken to investigate the effects of the emitted radiation by cell phones on testicular histomorphometry and biochemical analyses. Adult male Wistar rats weighing 180-200 g were randomly allotted to control, group A (switched off mode exposure), group B (1-hr exposure), group C (2-hr exposure) and group D (3-hr exposure). The animals were exposed to radiofrequency electromagnetic radiation of cell phone for a period of 28 days. Histomorphometry, biochemical and histological investigations were carried out. The histomorphometric parameters showed no significant change ( $p < .05$ ) in the levels of germinal epithelial diameter in all the experimental groups compared with the control group. There was no significant change ( $p < .05$ ) in cross-sectional diameter of all the experimental groups compared with the control group. Group D rats showed a significant decrease ( $p < .05$ ) in lumen diameter compared with group B rats. There was an uneven distribution of germinal epithelial cells in groups B, C and D. However, there was degeneration of the epithelia cells in group D when compared to the control and group B rats. Sera levels of malondialdehyde (MDA) and superoxide dismutase (SOD), which are markers of reactive oxygen species, significantly increased (MDA) and decreased (SOD), respectively, in all the experimental groups compared with the control group. Also sera levels of gonadotropic hormones (FSH, LH and testosterone) significantly decreased ( $p < .05$ ) in groups C and D compared with the control group. The study demonstrates that chronic exposure to radiofrequency electromagnetic radiation of cell phone leads to defective testicular function that is associated with increased oxidative stress and decreased gonadotropic hormonal profile.

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## **Does prolonged radiofrequency radiation emitted from Wi-Fi devices induce DNA damage in various tissues of rats?**

Akdag MZ, et al. J Chem Neuroanat. 2016.

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### **Abstract**

Wireless internet (Wi-Fi) providers have become essential in our daily lives, as wireless technology is evolving at a dizzying pace. Although there are different frequency generators, one of the most commonly used Wi-Fi devices are 2.4GHz frequency generators. These devices are heavily used in all areas of life but the effect of radiofrequency (RF) radiation emission on users is generally ignored. Yet, an increasing share of the public expresses concern on this issue. Therefore, this study intends to respond to the growing public concern. The purpose of this study is to reveal whether long term exposure of 2.4GHz frequency RF radiation will cause DNA damage of different tissues such as brain, kidney, liver, and skin tissue and testicular tissues of rats. The study was conducted on 16 adult male Wistar-Albino rats. The rats in the experimental group (n=8) were exposed to 2.4GHz frequency radiation for over a year. The rats in the sham control group (n=8) were subjected to the same experimental conditions except the Wi-Fi generator was turned off. After the exposure period was complete the possible DNA damage on the rat's brain, liver, kidney, skin, and testicular tissues was detected through the single cell gel electrophoresis assay (comet) method. The amount of DNA damage was measured as percentage tail DNA value. Based on the DNA damage results determined by the single cell gel electrophoresis (Comet) method, it was found that the % tail DNA values of the brain, kidney, liver, and skin tissues of the rats in the experimental group increased more than those in the control group. The increase of the DNA damage in all tissues was not significant ( $p>0.05$ ). However the increase of the DNA damage in rat testes tissue was significant ( $p<0.01$ ). In conclusion, long-term exposure to 2.4GHz RF radiation (Wi-Fi) does not cause DNA damage of the organs investigated in this study except testes. The results of this study indicated that testes are more sensitive organ to RF radiation.

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## **2.45-GHz microwave irradiation adversely affects reproductive function in male mouse, *Mus musculus* by inducing oxidative and nitrosative stress.**

Shahin S, et al. Free Radic Res. 2014.


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### **Abstract**

Electromagnetic radiations are reported to produce long-term and short-term biological effects, which are of great concern to human health due to increasing use of devices emitting EMR especially microwave (MW) radiation in our daily life. In view of the unavoidable use of MW emitting devices (microwaves oven, mobile phones, Wi-Fi, etc.) and their harmful effects on biological system, it was thought worthwhile to investigate the long-term effects of low-level MW irradiation on the reproductive function of male Swiss strain mice and its mechanism of action. Twelve-week-old mice were exposed to non-thermal low-level 2.45-GHz MW radiation (CW for 2 h/day for 30 days, power density = 0.029812 mW/cm<sup>2</sup>) and SAR = 0.018 W/Kg). Sperm count and sperm viability test were done as well as vital organs were processed to study different stress parameters. Plasma was used for testosterone and testis for 3 $\beta$  HSD assay. Immunohistochemistry of 3 $\beta$  HSD and nitric oxide synthase (i-NOS) was also performed in testis. We observed that MW irradiation induced a significant decrease in sperm count and sperm viability along with the decrease in seminiferous tubule diameter and degeneration of seminiferous tubules. Reduction in testicular 3 $\beta$  HSD activity and plasma testosterone levels was also noted in the exposed group of mice. Increased expression of testicular i-NOS was observed in the MW-irradiated group of mice. Further, these adverse reproductive effects suggest that chronic exposure to nonionizing MW radiation may lead to infertility via free radical species-mediated pathway.

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## **Immunohistopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices.**

Atasoy HI, et al. *J Pediatr Urol*. 2013.

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### **Abstract**

**OBJECTIVE:** To investigate effects on rat testes of radiofrequency radiation emitted from indoor Wi-Fi Internet access devices using 802.11.g wireless standards.

**METHODS:** Ten Wistar albino male rats were divided into experimental and control groups, with five rats per group. Standard wireless gateways communicating at 2.437 GHz were used as radiofrequency wave sources. The experimental group was exposed to radiofrequency energy for 24 h a day for 20 weeks. The rats were sacrificed at the end of the study. Intracardiac blood was sampled for serum 8-hydroxy-2'-deoxyguanosine levels. Testes were removed and examined histologically and immunohistochemically. Testis tissues were analyzed for malondialdehyde levels and prooxidant-antioxidant enzyme activities.

**RESULTS:** We observed significant increases in serum 8-hydroxy-2'-deoxyguanosine levels and 8-hydroxyguanosine staining in the testes of the experimental group indicating DNA damage due to exposure ( $p < 0.05$ ). We also found decreased levels of catalase and glutathione peroxidase activity in the experimental group, which may have been due to radiofrequency effects on enzyme activity ( $p < 0.05$ ).

**CONCLUSIONS:** These findings raise questions about the safety of radiofrequency exposure from Wi-Fi Internet access devices for growing organisms of reproductive age, with a potential effect on both fertility and the integrity of germ cells.

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## **The Effects of Cell Phone Waves (900 MHz-GSM Band) on Sperm Parameters and Total Antioxidant Capacity in Rats.**

Ghanbari M, et al. Int J Fertil Steril. 2013.  
[Show full citation](#)

### **Abstract**

**BACKGROUND:** There is tremendous concern regarding the possible adverse effects of cell phone microwaves. Contradictory results, however, have been reported for the effects of these waves on the body. In the present study, the effect of cell phone microwaves on sperm parameters and total antioxidant capacity was investigated with regard to the duration of exposure and the frequency of these waves.

**MATERIALS AND METHODS:** This experimental study was performed on 28 adult male Wistar rats (200-250 g). The animals were randomly assigned to four groups (n=7): i. control; ii. two-week exposure to cell phone-simulated waves; iii. three-week exposure to cell phonesimulated waves; and iv. two-week exposure to cell phone antenna waves. In all groups, sperm analysis was performed based on standard methods and we determined the mean sperm total antioxidant capacity according to the ferric reducing ability of plasma (FRAP) method. Data were analyzed by one-way ANOVA followed by Tukey's test using SPSS version 16 software.

**RESULTS:** The results indicated that sperm viability, motility, and total antioxidant capacity in all exposure groups decreased significantly compared to the control group ( $p < 0.05$ ). Increasing the duration of exposure from 2 to 3 weeks caused a statistically significant decrease in sperm viability and motility ( $p < 0.05$ ).

**CONCLUSION:** Exposure to cell phone waves can decrease sperm viability and motility in rats. These waves can also decrease sperm total antioxidant capacity in rats and result in oxidative stress.

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## **Effect of microwave exposure on the ovarian development of *Drosophila melanogaster*.**

Panagopoulos DJ. Cell Biochem Biophys. 2012.


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### **Abstract**

In the present experiments the effect of GSM radiation on ovarian development of virgin *Drosophila melanogaster* female insects was studied. Newly emerged adult female flies were collected and divided into separate identical groups. After the a lapse of certain number of hours-different for each group-the insects (exposed and sham-exposed) were dissected and their intact ovaries were collected and photographed under an optical microscope with the same magnification. The size of the ovaries was compared between exposed and sham-exposed virgin female insects, during the time needed for the completion of oogenesis and maturation of the first eggs in the ovarioles. Immediately after the intact ovaries were photographed, they were further dissected into individual ovarioles and treated for TUNEL and acridine-orange assays to determine the degree of DNA damage in the egg chamber cells. The study showed that the ovarian size of the exposed insects is significantly smaller than that of the corresponding sham-exposed insects, due to destruction of egg chambers by the GSM radiation, after DNA damage and consequent cell death induction in the egg chamber cells of the virgin females as shown in previous experiments on inseminated females. The difference in ovarian size between sham-exposed and exposed virgin female flies becomes most evident 39-45 h after eclosion when the first eggs within the ovaries are at the late vitellogenic and post-vitellogenic stages (mid-late oogenesis). More than 45 h after eclosion, the difference in ovarian size decreases, as the first mature eggs of the sham-exposed insects are leaving the ovaries and are laid.

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## **The effects of microwave emitted by cellular phones on ovarian follicles in rats.**

Gul A, et al. Arch Gynecol Obstet. 2009.  
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### **Abstract**

**OBJECTIVE:** The aim of this study was to investigate whether there were any toxic effects of microwaves of cellular phones on ovaries in rats.


**METHODS:** In this study, 82 female pups of rats, aged 21 days (43 in the study group and 39 in the control group) were used. Pregnant rats in the study group were exposed to mobile phones that were placed beneath the polypropylene cages during the whole period of pregnancy. The cage was free from all kinds of materials, which could affect electromagnetic fields. A mobile phone in a standby position for 11 h and 45 min was turned on to speech position for 15 min every 12 h and the battery was charged continuously. On the 21st day after the delivery, the female rat pups were killed and the right ovaries were removed. The volumes of the ovaries were measured and the number of follicles in every tenth section was counted.

**RESULTS:** The analysis revealed that in the study group, the number of follicles was lower than that in the control group. The decreased number of follicles in pups exposed to mobile phone microwaves suggest that intrauterine exposure has toxic effects on ovaries.

**CONCLUSION:** We suggest that the microwaves of mobile phones might decrease the number of follicles in rats by several known and, no doubt, countless unknown mechanisms.

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## **Immunohistopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices.**

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