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

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

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 Stated 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

Katya Miller miller.katya@gmail.com

1. Hinrikus, Hiie, et al. "Mechanism of low-level microwave radiation effect on nervous system." *Electromagnetic Biology and Medicine*, vol. 36, no. 2, 2016, pp. 202-12.
2. Saili et al. Effects of acute exposure to WIFI signals (2.45 GHz) on heart variability and blood pressure in Albinos rabbit. *Environmental Toxicology and Pharmacology*, vol. 40, no. 2, 2015, pp. 600-5.
3. Türedi S, et al. "The effects of prenatal exposure to a 900-MHz electromagnetic field on the 21-day-old male rat heart." *Electromagnetic Biology and Medicine*, vol. 34, no. 4, 2015, pp. 390-7.
4. Saini, Barjinder Singh and Anukul Pandey. "Effect of Wireless Network Radiation on Heart Rate Variability." *International Journal of Information and Electronics Engineering*, vol. 4, no. 1, 2014.
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9. Shandala, M.G., et al. "Study of nonionizing microwave radiation effects upon the central nervous system and behavior reaction." *Environmental Health Perspective*, vol. 30, 1979, pp. 115-21.
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Articles

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

Download citation https://doi.org/10.1080/15368378.2016.1251451 Check for updates

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

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.etap.2015.08.015

Cite this publication

Linda Saili
1.6 · Badji Mokhtar - Annaba University

Amel Hanini
17.78 · University of Carthage

Chiraz Smirani

+ 4

Inès Azzouz
12.32

Show more authors

Methods used: Electrocardiography

Electromagn Biol Med. 2015;34(4):390-7. doi: 10.3109/15368378.2014.952742. Epub 2014 Aug 28

The effects of prenatal exposure to a 900-MHz electromagnetic field on the 21-day-old male rat heart.

Türedi S[1], Hancı H[1], Topal Z[1], Ünal D[2], Mercantepe T[3], Bozkurt İ[4], Kaya H[5], Odacı E[1].

Author information

1 a Department of Histology and Embryology, Faculty of Medicine , Karadeniz Technical University , Trabzon , Turkey .
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3 c Department of Histology and Embryology, Faculty of Medicine , Recep Tayyip Erdoğan University , Rize , Turkey .
4 d Department of Biochemistry, Faculty of Pharmacy , Atatürk University , Erzurum , Turkey , and.
5 e Department of Electrical and Electronic Engineering, Faculty of Engineering , Karadeniz Technical University , Trabzon , Turkey.

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(2)). 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±0.12 mW/m^2 ii) Moderate exposure: when WNR level is 2.08±0.27 mW/m^2 iii) Maximum or calling mode exposure: when WNR level is 1.65±0.32 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

Ann Med Health Sci Res. 2012 Jul;2(2):146-51. doi: 10.4103/2141-9248.105662.

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

Alhusseiny A[1], Al-Nimer M, Majeed A.

Author information

1 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 prolongs the QT interval in human beings and it interferes with voltage criteria of ECG

Gen Physiol Biophys. 2011 Mar;30(1):84-9. doi: 10.4149/gpb_2011_01_84.

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

Esmekaya MA[1], Ozer C, Seyhan N.

Author information

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

Abstract

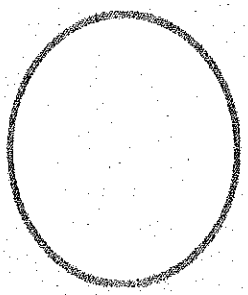
Oxidative stress may affect many cellular and physiological processes including gene expression, cell growth, and cell death. In the recent study, we aimed to investigate whether 900 MHz pulse-modulated radiofrequency (RF) fields induce oxidative damage on lung, heart and liver tissues. We assessed oxidative 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 significantly 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

[Indexed for MEDLINE]

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

An ICEMS Monograph



RAMAZZINI INSTITUTE

Ind Health. 2008 Aug;46(4):409-17.

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

Andrzejak R[1], Poreba R, Poreba M, Derkacz A, Skalik R, Gac P, Beck B, Steinmetz-Beck A, Pilecki W.

Author information

1 Department of Internal Medicine, Occupational Disease and Hypertension, Wroclaw Medical University, Wroclaw, 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 [ms2]--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(2)]--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(2)]--period I: 538.44+/-290.63, 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

Ind Health. 2008 Aug;46(4):409-17.

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

Andrzejak R[1], Poreba R, Poreba M, Derkacz A, Skalik R, Gac P, Beck B, Steinmetz-Beck A, Pilecki W.

Author information

1 Department of Internal Medicine, Occupational Disease and Hypertension, Wroclaw Medical University, Wroclaw, Poland.

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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 [ms2]--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(2)]--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(2)]--period I: 590.63, 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

Environ Health Perspect. 1979 Jun; 30: 115–121.
doi: 10.1289/ehp.7930115
Research Article

PMCID: PMC1637696
PMID: 446442

Study of nonionizing microwave radiation effects upon the central nervous system and behavior reactions.

M G Shandala, U D Dumanskiĭ, M I Rudnev, L K Ershova, and I P Los

Abstract

The biologic effect of an electromagnetic field of a frequency of 2375 +/- 50 MHz was studied in rats and rabbits in specially constructed absorbant chambers. The results of the investigations have shown that microwave radiation of 10, 50, 500 mu W/cm2 for 30 days, 7 hr/day, causes a number of changes in bioelectric brain activity and also in behavioral immunological, and cytochemical reactions. It was found that levels of 10 and 50 mu W/cm2 stimulate the electric brain activity at the initial stage of irradiation, while a level of 500 mu W/cm2 causes its suppression, as seen from the increase of slow, high amplitude delta-waves. At 500 mu W/cm2 a decrease in capacity of work, in value of unconditioned feeding stimulus, in investigating activity, electronic irradiation threshold, and in inhibition of cellular and humoral immunity were also observed.

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

[Indexed for MEDLINE]

Moshe Shafrir
1083 Vine Street, Unit 284
Healdsburg, CA 95448
moshe-arc@hotmail.com

Rec'd at Meeting 12/10/19
Item No. 3.1
From: Moshe Shafrir

December 10, 2019

SR city council study session
Moshe its 100 Santa Rosa Ave
Santa Rosa, CA 95404

I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Moshe Shafrir. I am an architect, licensed and practice in the state of California. I live in Healdsburg and why am I speaking in a public hearing in the City of Santa Rosa? I regularly spend time in Santa Rosa, business, main library, Shopping, 4th street, theater, and family. My daughter and son in law live in Santa Rosa as well as the relatives of my fiancé.

In 1983, I attended a conference about indoor pollution, one of the topics was toxic magnetic fields generated by the building electrical systems, and the study was how to design safe building environments. The conversation was about EMF (electromagnetic fields) generated by building currents of 60 hertz. At that time, we had not imagined that today we will be facing EMF with intensity and toxicity millions times fold.

In 1969, I served in the IDF (Israeli Defense Force) as an infantry soldier. We used radar equipment to detect movement in order to prevent unwanted border crossings. The radar units released EMF signals; the orders were not to stand in front of the units when turned on because of the toxic radiation and only to stand at the back of the units behind the shields. This was fifty years ago and I hope that today we know better.

Based on my experience and knowledge I have never connected my computers with WiFi, all are hard-wired at my home and office and work well. In 2015 in a new work place in Mill Valley, CA, after working for two weeks, I started filing discomfort, impaired mental function, was not able to empty fully my bladder and had to go frequently to the bathroom, difficulty to sleep at night, low work production, and the problem was worsening. I took work home and to my surprise; I was able to be fully functional and productive. It took me six weeks to find out the reason; it was the WiFi router in the conference room and my workstation was ten feet away. All the computers in the office were hard-wired and the WiFi router was the only wireless unit the office, it was powered 24-7 and used very little. I told my employer about my sensitivity and I asked to un-power the router when not in use and was threatened to be fired. I asked to file a worker comp claim, was given the form, filled it up and was fired on the same day.

Thou shalt not bear false witness against thy neighbor, Exodus, 20, 13. The Telecom industry publishes false statements, data, and research claiming that WiFi and wireless are safe, discredits and harasses independent scientists that prove and claim that the

References;

Dr. Sharon Goldberg Testifies at Michigan's 5G Small Cell Tower…
https://www.youtube.com/watch?v=CK0AliMe-KA&feature=youtu.be&fbclid=IwAR2rCQl_f_BIZvdc4b9rkzbMYpap3o3pPvC3U2UNWx_6gkRpQSIVYAgdp94

Dr. George Carlo - Telecom Fraud
https://drive.google.com/file/d/12cNwJWlmridRnm-fbz3HMm9PIz9TgPlY/view

Dietrich Klinghardt -EMF-Radiation
https://www.youtube.com/watch?v=ZwNYgmk--w0

Dr Devra Davis - The truth about mobile phone and wireless radiation
https://www.youtube.com/watch?v=BwyDCHf5iCY

Dr. Martin Pall is a published and widely cited scientist on the biological effects of electromagnetic fields and speaks internationally on this topic. He is particularly expert in how wireless radiation impacts the electrical systems in our bodies. He has published 7 studies showing existance exquisite sensitivity to electromagnetic fields (EMFs) in the voltage sensor in each cell, such that the force impacting our cells at the voltage sensor has massive impact on the biology on the cells of our bodies. Dr. Pall received his PhD at Caltech, one of the top scientific institutions in the world. Contact: martin_pall@wsu.edu
https://www.youtube.com/watch?v=3kQQyU8NHv8
https://www.youtube.com/watch?v=w8ATQF8omdI

FCC CHAIRMAN ON '5G:' WE WON'T STUDY IT, REGULATE IT, HAVE STANDARDS FOR IT; IGNORES HEALTH ?'s
https://www.youtube.com/watch?v=Bwgwe01SIMc&feature=share

Lloyds Insurers Refuse To Cover 5G Wi-Fi Illnesses
https://principia-scientific.org/lloyds-insurers-refuse-to-cover-5g-wi-fi-illnesses/?fbclid=IwAR2JSIAYqMq69-CKAIBh2KfoFZ4I3KgAYUvM0DWc_qs7oyekfQD_9Gf77JY

Rec'd at Meeting 12/10/19
Item No. 3.1
From: Martha Glaser

For the Santa Rosa City Council
From Martha Glaser

December 10, 2019

I attest and affirm that the following statements are true, accurate, and within my personal knowledge. My name is Martha Glaser.

I am the mother of two teens at Quest Forward High School in Santa Rosa, a homeowner, landlord, and an Adjunct Instructor in the College Skills Department pool at the Santa Rosa Junior College. My family has lived in California for generations and for over 30 years we've been in Santa Rosa. My parents were instrumental in creating a cultural community center, The Glaser Center. Barbara and Jules lived out a happy retirement in Santa Rosa for their last 24 and 28 years; they died and are buried here. Community is an important value in my family.

I'm here today because I want to be able to continue to contribute to this community. Although speaking out now about my experience with ElectroMagentic Sensitivity (EMS) is very hard to do, this is my contribution to our community at this time. I am not alone with this condition: EMS is a common problem, one with an official medical code:
ICD-10-CM Code W90. 8XXA – "Exposure to other nonionizing radiation, initial encounter."

Right now I can perceive the radio frequency microwave radiation herein. I already live in a world that forces me to carry a radiofrequency radiation meter around to make sure I am in a safe place to spend any significant amount of time in. The effect of my being in an environment like this for more than a few minutes makes me very unsettled, with a fight or flight feeling like I'm in danger. *(Turn on the meter).* This is the sound of the microwave radiation I perceive and react to. With prolonged exposure, I will more specifically feel head pain and ear, temple, and jaw pressure, will begin to feel anxiety, and difficulty remembering what I'm trying to say, will struggle to follow my own train of thoughts, get words wrong and forget simple words, get dizzy, lose my balance, get nosebleeds. I'll feel heart palpitations and exhaustion. In a microwave radiation ambient environment, I suffer with deep fatigue for which sleep does not revive me.

What has convinced me that my symptoms are induced by RF/microwave radiation is that, when I am away from antennas and towers, spend time in homes with no cell towers or antennas nearby, use corded landlines, ethernet wired high-speed internet, no smart meters, no smart devices, no streaming routers, I feel no symptoms at all. All I need to be healthy is simply to BE AWAY from such radiation! Simple. Or is it? It's getting harder and harder to be away from antennas and wireless devices.

The saturation of highly unnatural radiation that the telecom industry is trying to force upon communities makes it impossible to "just stay away from wireless devices" and enjoy the quiet of our homes and streets.

It breaks my heart to think that I won't be able to continue as part of this community. Antennas and radiation pushing community members out are destructive of community. It's unhealthy for ALL to put profits over community values. I know that Santa Rosa will no longer be habitable by me, with 112 more cell phone towers here. Even with 10 more. What's already here is already devastating to my health, and others feel this too, as more people observe the impact of the radiation on their own bodies and their loved ones.

Under the Telecom Act, you have the power to stop these companies from pushing through their agenda and chasing away many solid, rooted, community-minded people, You can avert harm for those who remain.

We have just learned this morning that 100 Mayors in Italy have just declared moratoria on 5G.

Many people in our community are now experiencing the effects of WTFs' pulsed microwave radiation. The lack of public safety is well proven. And safety is *required* under the Telecom Act of 1996 and other laws.

While I have expressed matters of opinion, I have also expressed facts that must be considered by law. I accept your oath of office.

Signed this 10th day of December 2019,

Martha Glaser

Martha Glaser,
glasermartha@gmail.com
PO Box 1533
Sebastopol, CA 95473

References:

1) *The New Yorker*, December 3, 2019.
"The One Traffic-Light Town With Some of the Fastest Internet in the U.S."
https://www.newyorker.com/tech/annals-of-technology/the-one-traffic-light-town-with-some-of-the-fastest-internet-in-the-us?
2) City of San Leandro, Fiber Optic Master Plan. (Santa Rosa could be the second "Smartest Wired" city!)
https://www.sanleandro.org/civicax/filebank/blobdload.aspx?BlobID=29084
3) The Commonwealth Club of California talk: "Humanity at a Crossroads: New Insights into Technology Risks for Humans and The Planet" https://www.commonwealthclub.org/events/archive/podcast/humanity-crossroads-new-insights-technology-risks-humans-and-planet, from last Tuesday, December 3, 2018.
4) The Disability Rights radio show, "Pushing Limits" link kpfa.org/episode/95056 from 9/6/2013.
5) World Health Organization Monograph No. 238:Extremely Low Frequency Fields. Environmental Health Criteria.

4 August 2016.
who.int/peh-emf/publications/elf_ehc/en/

About the meter used: The Acousticom 2 is a simple to use RF detector which quickly identifies peak RF exposure to Radio Frequency Radiation. It detects the power density of frequencies between 200MHz to 8GHz. This detector also has a sound signal analysis feature which aids in source identification and mitigation. They can be purchased online for $189.00 at this time, although the price seems to be dropping. Other RF meters are available online for sale as well.
Eventually many of us might be carrying a meter alongside our cell phones.

Rec'd at Meeting 12/10/19
Item No. 3.1
From: Janice Bradshaw

~~December 10, 2019~~

To: Santa Rosa City Council Members
From: J. Bradshaw

I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Janice Bradshaw and I'm a Mother, Grandmother, past Elementary Teacher and resident of Santa Rosa, CA.

The polarized, pulsed-modulated microwave radiation from Wireless Telecommunications Facilities (WTFs) that the City wishes to allow without regulation would produce many deleterious effects on the neurologic functioning of the people of Santa Rosa.

It is well established in relevant peer-reviewed scientific studies that the highly xenobiotic (foreign-to-life) type of radiation deployed by WTFs produces very serious adverse impacts on the neurological systems of humans and animals.

The nervous system at the whole-body level relies on precise electron flow to and from synapses as well as potential energy to function. The puled-modulated RF radiation that WTFs deploy interferes with the proper functioning of this delicate system.

The addition of more WTFs emitting constant 24/7/365/forever pulsed microwave radiation will lead to more neurologic problems, including without limitation demyelination of neurons, melatonin suppression, insomnia, fatigue, lack of productivity, learning and memory impairments, lowered IQ, attention deficit disorder, hyperactivity, early dementias, headache, anxiety, depression, violent behavior, and accelerated neurodegeneration. Let me be clear that, by the physical nature of such microwave radiation action upon our delicate nervous system, *every* person is adversely affected.

Wavelengths that are maximally absorbed by our bodies are those with dimensions approaching those of our height as well as our body parts and internal organs. The wavelengths intended for close-proximity deployment are of decimeter, centimeter, and millimeter lengths: all combining for maximal absorption in the brain and other organs. Kindly view the attached chart to be submitted herewith: note the particular harm to children and to everyone's brain, as well as devastation to bees and birds

I also submit into the public record substantial evidence that is peer-reviewed and, as such, admissible under the Supreme Court Daubert Rule. The evidence cannot lawfully be refused, ignored, or mischaracterized as mere "concern". Indeed, 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,

Janice Bradshaw

Janice Bradshaw janicebradshaw4@gmail.com

1. Varghese, Rini, et al. "Rats exposed to 2.45 GHz of non-ionizing radiation exhibit behavioral changes with increased brain expression of apoptotic caspase 3." *Pathophysiology* (2017).

2. Shahin, Saba, et al. "2.45 GHz Microwave radiation impairs hippocampal learning and spatial memory: Involvement of local stress mechanism induced suppression of iGluR/ERK/CREB signaling." *Toxicological Sciences* (2017).

3. Kim, Ju Hwan, et al. "Long-term exposure to 835 MHz RF-EMF induces hyperactivity, autophagy and demyelination in the cortical neurons of mice." *Scientific Reports*, vol. 7, no. 41129, 2017.

4. Sharma, Archana, et al. "Ten gigahertz microwave radiation impairs spatial memory, enzymes activity, and histopathology of developing mice brain." *Molecular and Cellular Biochemistry*, 2017.

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ALL THE MICROWAVE RADIATION AROUND AND INSIDE US: MUCH WORSE WITH 5G ADDED!

With the deployment of 5G wireless, the array of currently used and planned, harmful micro-wavelengths and modulation patterns to be deployed in every public and private space, 24-7-365-forever, is staggering. Hold up your hands to illustrate each of these wavelengths, as absorbed in your body and brain:

- **5G: 600 MHz = cm microwaves of 50cm ≈ 20 inches ("MHz" = Megahertz)**
- **4G: 700 MHz = cm microwaves of ~43cm ≈ 17 inches ("cm" = centimeter)**
- **3G/4G: 800 MHz = cm microwaves of 37.5cm ≈ 15 inches**
- **3G/4G: 900 MHz = cm microwaves of ~33.3cm ≈ 13 inches**
- **3G/4G: 1800 MHz = cm microwaves of ~16.7cm ≈ 6.6 inches**
- **3G/4G: 2100 MHz = cm microwaves of ~14.3cm ≈ 5.6 inches**
- **Wi-Fi: 2450 MHz = cm microwaves of ~12cm ≈ 5 inches**
- **5G: 3100 MHz to 3550 MHz = ~9.7 to ~8.5cm ≈ 3.8 to 3.3 inches**
- **5G: 3550 MHz to 3700 MHz = ~8.5cm to ~8.1cm ≈ 3.3 to 3.2 inches**
- **5G: 3700 MHz to 4200 MHz = ~8.1cm to ~7cm ≈ 3.2 to 2.8 inches**
- **5G: 4200 to 4900 MHz = ~7cm to ~6cm ≈ 2.8 to 2.4 inches**
- **Wi-Fi: 5800 MHz = ~5cm microwaves of ~2 inches ("mm" = millimeter)**
- **5G: 24,250 to 24,450 MHz = mm microwaves of ~12mm ≈ 0.5 inch**
- **5G: 25,050 to 25,250 MHz = mm microwaves of ~12mm ≈ 0.5 inch**
- **5G: 25,250 to 27,500 MHz = mm microwaves of ~11mm ≈ 0.4 inch**
- **5G: 27,500 to 29,500 MHz = mm microwaves of ~10mm ≈ 0.4 inch**
- **5G: 31,800 to 33,400 MHz = mm microwaves of ~9mm ≈ 0.4 inch**
- **5G: 37,000 to 40,000 MHz = mm microwaves of ~8mm ≈ 0.3 inch**
- **5G: 42,000 to 42,500 MHz = mm microwaves of ~7mm ≈ 0.3 inch**
- **5G: 64,000 to 71,000 MHz = mm microwaves of ~5mm ≈ 0.2 inch**
- **5G: 71,000 to 76,000 MHz = mm microwaves of ~4mm ≈ 0.2 inch**
- **5G: 81,000 to 86,000 MHz = mm microwaves of ~3.6mm ≈ 0.1 inch**

Microwave radiation bio-effects increase synergistically, not merely additively, with the markedly increased complexity of many simultaneous wavelength deployments for 4G/5G Distributed Antenna System (DAS).

5G would deploy more bandwidth and therefore data-per-second than ever deployed in the entirety of human history – *combined* – to produce more adverse effects than ever previously manifested by wireless systems. Worse, 5G microwave radiation is to be concentrated semi-directionally into a 15-degree arc, which deployment approaches maser-like, direct-energy weaponry (DEW). A maser is a microwave laser or microwave taser.

As a wavelength approaches body-part size, its absorption increases exponentially. Thus, microwaves, waves in the "size of life", have been known for decades as the most bioactive and harmful of radiofrequencies. When a wavelength approximates a body dimension, resonance is achieved: the body part or whole body effectively becomes an antenna. Similarly, this radiation interferes with electronic medical devices. Mobile Communications Safety p 65-94 | *RF interference (RFI) of medical devices by mobile communications transmitters.* The ~20" wave penetrates deeply into human and animal bodies, maximizing harm in babies and small children. The ~2" – 4" waves target the primary organs: brain, heart, lungs, liver, thyroid, thymus, kidneys, genitalia, in humans and larger animals. The millimeter (mm) waves target the most critical organs of perception – eyes and ears – in addition to the body's largest organ: the skin. Resonating at the lengths of insect antennas, these mm microwaves ensure the extermination of pollinating insects such as bees and butterflies within a year of deployment, and birds and all other wildlife thereafter. Farm animals are immediately harmed by 4G/5G DAS radiation operations, which must, wherever deployed, destroy agriculture. Initially torturesome to all living beings by way of neurologic interference, organisms including humans are first incapacitated and then destroyed. The time to halt this is prior to deployment. Do oppose microwave radiation deployment in your neighborhood, municipality and state – before it's too late!

PLEASE research SCIENTIFIC STUDIES on the HARMFUL EFFECTS of EMFs on the following websites:

www.ehtrust.org (Environmental Health Trust - Science)

www.5gcrisis.com (5G Crisis - Science)

powerwatch.org.uk. (Powerwatch)

www.emfscientist.org (More than 240 scientists from over 40 countries published an Appeal to the United Nations to reduce public exposure to EMFs And are calling for a moratorium on 5G.)

www.bioinitiative.org (The BioInitiative Reports reference more than 3,800 Peer-Reviewed published studies.)

https://goo.gl/jgh5kf (The National Toxicology Program)

https://goo.gl/9DQC6M (International Agency for Research on Cancer at the World Health Organization)

Pathophysiology. 2018 Mar;25(1):19-30. doi: 10.1016/j.pathophys.2017.11.001. Epub 2017 Nov 14.

Rats exposed to 2.45GHz of non-ionizing radiation exhibit behavioral changes with increased brain expression of apoptotic caspase 3.

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Abstract

In recent years there has been a tremendous increase in use of Wi-Fi devices along with mobile phones, globally. Wi-Fi devices make use of 2.4GHz frequency. The present study evaluated the impact of 2.45GHz radiation exposure for 4h/day for 45days on behavioral and oxidative stress parameters in female Sprague Dawley rats. Behavioral tests of anxiety, learning and memory were started from day 38. Oxidative stress parameters were estimated in brain homogenates after sacrificing the rats on day 45. In morris water maze, elevated plus maze and light dark box test, the 2.45GHz radiation exposed rats elicited memory decline and anxiety behavior. Exposure decreased activities of super oxide dismutase, catalase and reduced glutathione levels whereas increased levels of brain lipid peroxidation was encountered in the radiation exposed rats, showing compromised anti-oxidant defense. Expression of caspase 3 gene in brain samples were quantified which unraveled notable increase in the apoptotic marker caspase 3 in 2.45GHz radiation exposed group as compared to sham exposed group. No significant changes were observed in histopathological examinations and brain levels of TNF-α. Analysis of dendritic arborization of neurons showcased reduction in number of dendritic branching and intersections which corresponds to alteration in dendritic structure of neurons, affecting

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Article Navigation

From the Cover: 2.45-GHz Microwave Radiation Impairs Hippocampal Learning and Spatial Memory: Involvement of Local Stress Mechanism-Induced Suppression of iGluR/ERK/CREB Signaling

FREE

Saba Shahin, Somanshu Banerjee, Vivek Swarup, Surya Pal Singh, Chandra Mohini Chaturvedi

Toxicological Sciences, Volume 161, Issue 2, February 2018, Pages 349–374, https://doi.org/10.1093/toxsci/kfx221

Published: 23 October 2017

Abstract

Microwave (MW) radiation induced oxidative stress reduces dendritic arborization, spine density and number of hippocampal pyramidal neurons and hence, impair learning and spatial memory through p53-dependent/independent apoptosis of hippocampal neuronal and nonneuronal

- Article
- Open Access
- Published: 20 January 2017

Long-term exposure to 835 MHz RF-EMF induces hyperactivity, autophagy and demyelination in the cortical neurons of mice

Ju Hwan Kim, Da-Hyeon Yu, Yang Hoon Huh, Eun Ho Lee, Hyung-Gun Kim & Hak Rim Kim✉

Scientific Reports 7, Article number: 41129 (2017)

Abstract

Radiofrequency electromagnetic field (RF-EMF) is used globally in conjunction with mobile communications. There are public concerns of the perceived deleterious biological consequences of RF-EMF exposure. This study assessed neuronal effects of RF-EMF on the cerebral cortex of the mouse brain as a proxy for cranial exposure during mobile phone use. C57BL/6 mice were exposed to 835 MHz RF-EMF at a specific absorption rate (SAR) of 4.0 W/kg for 5 hours/day during 12 weeks. The aim was to examine activation of autophagy pathway in the cerebral cortex, a brain region that is located relatively externally. Induction of autophagy genes and production of proteins including LC3B-II and Beclin1 were increased and accumulation of autolysosome was observed in neuronal cell bodies. However, proapoptotic factor Bax was down-regulted in the cerebral cortex. Importantly, we found that RF-EMF exposure led to myelin sheath damage and mice displayed hyperactivity-like behaviour. The data suggest that autophagy may act as a protective pathway for the neuronal cell bodies in the cerebral cortex during radiofrequency exposure. The observations that neuronal cell bodies remained structurally stable but demyelination was induced in cortical neurons following prolonged RF-EMF suggests a potential cause of neurological or neurobehavioural disorders.

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SpringerLink FULL-TEXT ARTICLE

Mol Cell Biochem. 2017 Nov;435(1-2):1-13. doi: 10.1007/s11010-017-3051-8. Epub 2017 May 3.

Ten gigahertz microwave radiation impairs spatial memory, enzymes activity, and histopathology of developing mice brain.

Sharma A[1], Kesari KK[2,3], Saxena VK[4], Sisodia R[1].

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Abstract

For decades, there has been an increasing concern about the potential hazards of non-ionizing electromagnetic fields that are present in the environment and alarming as a major pollutant or electro-pollutant for health risk and neuronal diseases. Therefore, the objective of the present study was to explore the effects of 10 GHz microwave radiation on developing mice brain. Two weeks old mice were selected and divided into two groups (i) sham-exposed and (ii) microwave-exposed groups. Animals were exposed for 2 h/day for 15 consecutive days. After the completion of exposure, within an hour, half of the animals were autopsied immediately and others were allowed to attain 6 weeks of age for the follow-up study. Thereafter results were recorded in terms of various biochemical, behavioral, and histopathological parameters. Body weight result showed significant changes immediately after treatment, whereas non-significant changes were observed in mice attaining 6 weeks of age. Several other endpoints like brain weight, lipid peroxidation, glutathione, protein, catalase, and superoxide dismutase were also found significantly ($p < 0.05$) altered in mice whole brain. These significant differences were found immediately after exposure and also in follow-up on attaining 6 weeks of age in microwave exposure group. Moreover, statistically significant ($p < 0.001$) effect was investigated in spatial memory of the animals, in learning to locate the position of platform in Morris water maze test. Although in probe trial test, sham-exposed animals spent more time in searching for platform into the target quadrant than in opposite or other quadrants. Significant alteration in histopathological

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ELSEVIER FULL-TEXT ARTICLE

J Chem Neuroanat. 2016 Sep;75(Pt B):94-8. doi: 10.1016/j.jchemneu.2016.01.002. Epub 2016 Jan 8.

The 2100MHz radiofrequency radiation of a 3G-mobile phone and the DNA oxidative damage in brain.

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Abstract

We aimed to evaluate the effect of 2100MHz radiofrequency radiation emitted by a generator, simulating a 3G-mobile phone on the brain of rats during 10 and 40 days of exposure. The female rats were randomly divided into four groups. Group I; exposed to 3G modulated 2100MHz RFR signal for 6h/day, 5 consecutive days/wk for 2 weeks, group II; control 10 days, were kept in an inactive exposure set-up for 6h/day, 5 consecutive days/wk for 2 weeks, group III; exposed to 3G modulated 2100MHz RFR signal for 6h/day, 5 consecutive days/wk for 8 weeks and group IV; control 40 days, were kept in an inactive exposure set-up for 6h/day, 5 consecutive days/wk for 8 weeks. After the genomic DNA content of brain was extracted, oxidative DNA damage (8-hydroxy-2'deoxyguanosine, pg/mL) and malondialdehyde (MDA, nmoL/g tissue) levels were determined. Our main finding was the increased oxidative DNA damage to brain after 10 days of exposure with the decreased oxidative DNA damage following 40 days of exposure compared to their control groups. Besides decreased lipid peroxidation end product, MDA, was observed after 40 days of exposure. The measured decreased quantities of damage during the 40 days of exposure could be the means of adapted and increased DNA repair mechanisms.

Format: Abstract

Brain Res. 2015 Mar 19;1601:92-101. doi: 10.1016/j.brainres.2015.01.019. Epub 2015 Jan 15.

Exposure to 900 MHz electromagnetic fields activates the mkp-1/ERK pathway and causes blood-brain barrier damage and cognitive impairment in rats.

Tang J[1], Zhang Y[1], Yang L[1], Chen Q[1], Tan L[1], Zuo S[1], Feng H[1], Chen Z[1], Zhu G[2].

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Abstract

With the rapid increase in the number of mobile phone users, the potential adverse effects of the electromagnetic field radiation emitted by a mobile phone has become a serious concern. This study demonstrated, for the first time, the blood-brain barrier and cognitive changes in rats exposed to 900 MHz electromagnetic field (EMF) and aims to elucidate the potential molecular pathway underlying these changes. A total of 108 male Sprague-Dawley rats were exposed to a 900 MHz, 1 mW/cm(2) EMF or sham (unexposed) for 14 or 28 days (3h per day). The specific energy absorption rate (SAR) varied between 0.016 (whole body) and 2 W/kg (locally in the head). In addition, the Morris water maze test was used to examine spatial memory performance determination. Morphological changes were investigated by examining ultrastructural changes in the hippocampus and cortex, and the Evans Blue assay was used to assess blood brain barrier (BBB) damage. Immunostaining was performed to identify heme oxygenase-1 (HO-1)-positive neurons and albumin extravasation detection. Western blot was used to determine HO-1 expression, phosphorylated ERK expression and the upstream mediator, mkp-1 expression. We found that the frequency of crossing platforms and the percentage of time spent in the target quadrant were lower in rats exposed to EMF for 28 days than in rats exposed to EMF for 14 days and unexposed rats. Moreover, 28 days of EMF exposure induced cellular edema and neuronal cell organelle degeneration in the rat. In addition, damaged BBB permeability, which resulted in albumin and HO-1 extravasation were observed in the hippocampus and cortex. Thus, for the first time, we found that EMF exposure for 28 days induced the

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Int J Radiat Biol. 2015 Jul;91(7):555-61. doi: 10.3109/09553002.2015.1028599. Epub 2015 M

Effects of 2.4 GHz radiofrequency radiation emitted from Wi-Fi equipment on microRNA expression in brain tissue.

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Author information

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Abstract

PURPOSE: MicroRNAs (miRNA) play a paramount role in growth, differentiation, proliferation and cell death by suppressing one or more target genes. However, their interaction with radiofrequencies is still unknown. The aim of this study was to investigate the long-term effects of radiofrequency radiation emitted from a Wireless Fidelity (Wi-Fi) system on some of the miRNA in brain tissue.

MATERIALS AND METHODS: The study was carried out on 16 Wistar Albino adult male rats by dividing them into two groups such as sham (n = 8) and exposure (n = 8). Rats in the exposure group were exposed to 2.4 GHz radiofrequency (RF) radiation for 24 hours a day for 12 months (one year). The same procedure was applied to the rats in the sham group except the Wi-Fi system was turned off. Immediately after the last exposure, rats were sacrificed and their brains were removed. miR-9-5p, miR-29a-3p, miR-106b-5p, miR-107, miR-125a-3p in brain were investigated in detail.

RESULTS: The results revealed that long-term exposure of 2.4 GHz Wi-Fi radiation can alter expression of some of the miRNAs such as miR-106b-5p (adj p* = 0.010) and miR-107 (adj p* = 0.005). We observed that mir 107 expression is 3.3 times and miR- 106b-5p expression is 3.65 times lower in the exposure group than in the control group. However, miR-9-5p, miR-29a-3p and miR-125a-3p levels in brain were not altered.

CONCLUSION: Long-term exposure of 2.4 GHz RF may lead to adverse effects such as neurodegenerative diseases originated from the alteration of some miRNA expression and more studies should be devoted to the effects of RF radiation on miRNA expression levels.

KEYWORDS: 2.4 GHz radiofrequency; Wi-Fi; diseases; electromagnetic fields; miRNA in brain

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EEG Changes Due to Experimentally Induced 3G Mobile Phone Radiation

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Suminori Akiba, Academic Editor

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Competing Interests: Suzanne Roggeveen has read the journal's policy and the authors have the following conflict: Jim van Os is a PLOS ONE Editorial Board member. This does not alter the authors' adherence to all the PLOS ONE policies on sharing data and materials.

Conceived and designed the experiments: SR JO WV RL. Performed the experiments: SR RL. Analyzed the data: SR RL. Contributed reagents/materials/analysis tools: SR JO RL. Wrote the paper: SR JO WV RL.

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Abstract

The aim of this study was to investigate whether a 15-minute placement of a 3G dialing mobile phone causes direct changes in EEG activity compared to the placement of a sham phone. Furthermore, it was investigated whether placement of the mobile phone on the ear or the heart would result in different outcomes. Thirty-one healthy females participated. All subjects were measured twice: on one of the two days the mobile phone was attached to the ear, the other day to the chest. In this single-blind, cross-over design, assessments in the sham phone condition were conducted directly preceding and following the mobile phone exposure. During each assessment, EEG activity and radiofrequency radiation were recorded jointly. Delta, theta, alpha, slowbeta, fastbeta, and gamma activity was computed. The association between radiation exposure and the EEG was tested using multilevel random regression analyses with radiation as predictor of main interest. Significant radiation effects were found for the alpha, slowbeta, fastbeta, and gamma bands. When analyzed separately, ear location of the phone was associated with significant results, while chest placement was not. The results support the notion that EEG alterations are associated with mobile phone usage and that the effect is dependent on site of placement. Further studies are required to demonstrate the physiological relevance of these findings.

Journal of Biomedical Physics & Engineering

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A Challenging Issue in the Etiology of Speech Problems: The Effect of Maternal Exposure to Electromagnetic Fields on Speech Problems in the Offspring

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Accepted 2014 Dec 31.

Abstract

Background

Nowadays, mothers are continuously exposed to different sources of electromagnetic fields before and even during pregnancy. It has recently been shown that exposure to mobile phone radiation during pregnancy may lead to adverse effects on the brain development in offspring and cause hyperactivity. Researchers have shown that behavioral problems in laboratory animals which have a similar appearance to ADHD are caused by intrauterine exposure to mobile phones.

Clin Neurophysiol. 2014 Feb;125(2):277-86. doi: 10.1016/j.clinph.2013.07.018. Epub 2013 Sep 4.

The alteration of spontaneous low frequency oscillations caused by acute electromagnetic fields exposure.

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Abstract

OBJECTIVE: The motivation of this study is to evaluate the possible alteration of regional resting state brain activity induced by the acute radiofrequency electromagnetic field (RF-EMF) exposure (30min) of Long Term Evolution (LTE) signal.

METHODS: We designed a controllable near-field LTE RF-EMF exposure environment. Eighteen subjects participated in a double-blind, crossover, randomized and counterbalanced experiment including two sessions (real and sham exposure). The radiation source was close to the right ear. Then the resting state fMRI signals of human brain were collected before and after the exposure in both sessions. We measured the amplitude of low frequency fluctuation (ALFF) and fractional ALFF (fALFF) to characterize the spontaneous brain activity.

RESULTS: We found the decreased ALFF value around in left superior temporal gyrus, left middle temporal gyrus, right superior temporal gyrus, right medial frontal gyrus and right

Format: Abstract

Neurol Res. 2014 Sep;36(9):800-3. doi: 10.1179/1743132813Y.0000000276. Epub 2014 Jan

Behavior and memory evaluation of Wistar rats exposed to 1·8 GHz radiofrequency electromagnetic radiation.

Júnior LC, Guimarães Eda S, Musso CM, Stabler CT, Garcia RM, Mourão-Júnior CA, Andreazzi AE.

Abstract

BACKGROUND: The development of communication systems has brought great social and economic benefits to society. As mobile phone use has become widespread, concerns have emerged regarding the potential adverse effects of radiofrequency electromagnetic radiation (RF-EMR) used by these devices.

OBJECTIVE: To verify potential effects of mobile phone radiation on the central nervous system (CNS) in an animal model.

METHODS: Male Wistar rats (60 days old) were exposed to RF-EMR from a Global System for Mobile (GSM) cell phone (1·8 GHz) for 3 days. At the end of the exposure, the following behavioral tests were performed: open field and object recognition.

RESULTS: Our results showed that exposed animals did not present anxiety patterns or working memory impairment, but stress behavior actions were observed.

CONCLUSION: Given the results of the present study, we speculate that RF-EMR does not promote CNS impairment, but suggest that it may lead to stressful behavioral patterns.

KEYWORDS: Behavior,; Mobile phone,; Radiation,; Work memory

PMID: 24620965 DOI: 10.1179/1743132813Y.0000000276

[Indexed for MEDLINE]

MeSH terms

LinkOut - more resources

PLOS ONE

Reduction of Phosphorylated Synapsin I (Ser-553) Leads to Spatial Memory Impairment by Attenuating GABA Release after Microwave Exposure in Wistar Rats

Simo Qiao, Ruiyun Peng, Haitao Yan, Yabing Gao, Changzhen Wang, Shuiming Wang, Yong Zou, Xinping Xu, Li Zhao, Ji Dong, Zhentao Su, Xinxin Feng , Lifeng Wang , Xiangjun Hu

Published: April 17, 2014 • https://doi.org/10.1371/journal.pone.0095503

Abstract

Background

Abnormal release of neurotransmitters after microwave exposure can cause learning and memory deficits. This study investigated the mechanism of this effect by exploring the potential role of phosphorylated synapsin I (p-Syn I).

Methods

Wistar rats, rat hippocampal synaptosomes, and differentiated (neuronal) PC12 cells were exposed to microwave radiation for 5 min at a mean power density of 30 mW/cm^2. Sham group rats, synaptosomes, and cells were otherwise identically treated and acted as controls for all of the following post-exposure analyses. Spatial learning and memory in rats was assessed using the Morris Water Maze (MWM) navigation task. The protein expression and presynaptic distribution of p-Syn I and neurotransmitter transporters were examined via western blotting and immunoelectron microscopy, respectively. Levels amino acid neurotransmitter release from rat hippocampal synaptosomes and PC12 cells were measured using high performance liquid chromatograph (HPLC) at 6 hours after exposure, with or without synapsin I silencing via shRNA transfection.

Results

In the rat experiments, there was a decrease in spatial memory performance after microwave exposure. The expression of p-Syn I (ser-553) was decreased at 3 days post-exposure and elevated at later time points. Vesicular GABA transporter (VGAT) was significantly elevated after exposure. The GABA release from synaptosomes was attenuated and p-Syn I (ser-553) and VGAT were both enriched in small clear synaptic vesicles, which abnormally assembled in the presynaptic terminal after exposure. In the PC12 cell experiments, the expression of p-Syn I (ser-553) and GABA release were both attenuated at 6 hours after exposure. Both microwave exposure and p-Syn I silencing reduced GABA release and maximal reduction was found for the combination of the two, indicating a synergetic effect.

Conclusion

p-Syn I (ser-553) was found to play a key role in the impaired GABA release and cognitive dysfunction that was induced by microwave exposure.

Citation: Qiao S, Peng R, Yan H, Gao Y, Wang C, Wang S, et al. (2014) Reduction of Phosphorylated Synapsin I (Ser-553) Leads to Spatial Memory Impairment by Attenuating GABA Release after Microwave Exposure in Wistar Rats. PLoS ONE 9(4): e95503. https://doi.org/10.1371/journal.pone.0095503

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Competing interests: The authors have declared that no competing interests exist.

Introduction

Microwaves have become extremely important for many industries, particularly in communication and medical fields. With increasing understanding of the latent health hazards of microwave exposure, it is becoming clear that effective methods for protection and treatment of those working in the presence of microwaves are urgently needed. It has been reported that frequent

Format: Abstract

Full text links

SAGE journals

Toxicol Ind Health. 2016 Jun;32(6):968-79. doi: 10.1177/0748233714525497. Epub 2014 Mar

Maternal mobile phone exposure alters intrinsic electrophysiological properties of CA1 pyramidal neurons in rat offspring.

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Abstract

Some studies have shown that exposure to electromagnetic field (EMF) may result in structural damage to neurons. In this study, we have elucidated the alteration in the hippocampal function of offspring Wistar rats (n = 8 rats in each group) that were chronically exposed to mobile phones during their gestational period by applying behavioral, histological, and electrophysiological tests. Rats in the EMF group were exposed to 900 MHz pulsed-EMF irradiation for 6 h/day. Whole cell recordings in hippocampal pyramidal cells in the mobile phone groups did show a decrease in neuronal excitability. Mobile phone exposure was mostly associated with a decrease in the number of action potentials fired in spontaneous activity and in response to current injection in both male and female groups. There was an increase in the amplitude of the afterhyperpolarization (AHP) in mobile phone rats compared with the control. The results of the passive avoidance and Morris water maze assessment of learning and memory performance showed that phone exposure significantly altered learning acquisition and memory retention in male and female rats compared with the control rats. Light microscopy study of brain sections of the control and mobile phone-exposed rats showed normal morphology.Our results suggest that exposure to mobile phones adversely affects the cognitive performance of both female and male offspring rats using behavioral and electrophysiological techniques.

Format: Abstract

J Toxicol Environ Health B Crit Rev. 2014;17(5):247-58. doi: 10.1080/10937404.2014.923356.

Could myelin damage from radiofrequency electromagnetic field exposure help explain the functional impairment electrohypersensitivity? A review of the evidence.

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Author information

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Abstract

Myelin provides the electrical insulation for the central and peripheral nervous system and develops rapidly in the first years of life, but continues into mid-life or later. Myelin integrity is vital to healthy nervous system development and functioning. This review outlines the development of myelin through life, and then considers the evidence for an association between myelin integrity and exposure to low-intensity radiofrequency electromagnetic fields (RF-EMFs) typical in the modern world. In RF-EMF peer-reviewed literature examining relevant impacts such as myelin sheath, multiple sclerosis, and other myelin-related diseases, cellular examination was included. There are surprisingly little data available in each area, but considered together a picture begins to emerge in RF-EMF-exposed cases: (1) significant morphological lesions in the myelin sheath of rats; (2) a greater risk of multiple sclerosis in a study subgroup; (3) effects in proteins related to myelin production; and (4) physical symptoms in individuals with functional impairment electrohypersensitivity, many of which are the same as if myelin were affected by RF-EMF exposure, giving rise to symptoms of demyelination. In the latter, there are exceptions; headache is common only in electrohypersensitivity, while ataxia is typical of demyelination but infrequently found in the former group. Overall, evidence from in vivo and in vitro and epidemiological studies suggests an association between RF-EMF exposure and either myelin deterioration or a direct impact on neuronal conduction, which may account for many electrohypersensitivity symptoms. The most vulnerable are likely to be those in utero through to at least mid-teen years, as well as ill and elderly individuals.

Format: Abstract

Neurol Res. 2014 Dec;36(12):1072-9. doi: 10.1179/1743132814Y.0000000392. Epub 2014 M

Effects of mobile phone radiation (900 MHz radiofrequency) on structure and functions of rat brain.

Saikhedkar N, Bhatnagar M, Jain A, Sukhwal P, Sharma C, Jaiswal N.

Abstract

OBJECTIVES: The goals of this study were: (1) to obtain basic information about the effects of long-term use of mobile phones on cytological makeup of the hippocampus in rat brains (2) to evaluate the effects on antioxidant status, and (3) to evaluate the effects on cognitive behavior particularly on learning and memory.

METHODS: Rats (age 30 days, 120 ± 5 g) were exposed to 900 MHz radio waves by means of a mobile hand set for 4 hours per day for 15 days. Effects on anxiety, spatial learning, and memory were studied using the open field test, the elevated plus maze, the Morris water maze (MWM), and the classic maze test. Effects on brain antioxidant status were also studied. Cresyl violet staining was done to assess the neuronal damage.

RESULT: A significant change in behavior, i.e., more anxiety and poor learning was shown by test animals as compared to controls and sham group. A significant change in the level of antioxidant enzymes and non-enzymatic antioxidants, and an increase in lipid peroxidation were observed in the test rats. Histological examination showed neurodegenerative cells in hippocampal sub regions and the cerebral cortex.

DISCUSSION: Thus our findings indicate extensive neurodegeneration on exposure to radio waves. Increased production of reactive oxygen species due to exhaustion of enzymatic and non-enzymatic antioxidants and increased lipid peroxidation indicate extensive neurodegeneration in selective areas of CA1, CA3, DG, and the cerebral cortex. This extensive neuronal damage results in alterations in behavior related to memory and learning.

KEYWORDS: Antioxidant enzymes,; Anxiety,; Behavior,; Lipid peroxidation,; Mobile radiations,; Neurodegeneration

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[Indexed for MEDLINE]

Electromagn Biol Med. 2012 Mar;31(1):57-66. doi: 10.3109/15368378.2011.624652. Epub 20

The influence of microwave radiation from cellular phone on fetal rat brain.

Jing J[1], Yuhua Z, Xiao-qian Y, Rongping J, Dong-mei G, Xi C.

Author information

1 Institute of Chemistry and Bacteria Detection, Department of Public Health, Shandong University, and Department of Radiology, Shandong Qianfoshan Hospital, Shandong, China.

Abstract

The increasing use of cellular phones in our society has brought focus on the potential detrimental effects to human health by microwave radiation. The aim of our study was to evaluate the intensity of oxidative stress and the level of neurotransmitters in the brains of fetal rats chronically exposed to cellular phones. The experiment was performed on pregnant rats exposed to different intensities of microwave radiation from cellular phones. Thirty-two pregnant rats were randomly divided into four groups: CG, GL, GM, and GH. CG accepted no microwave radiation, GL group radiated 10 min each time, GM group radiated 30 min, and GH group radiated 60 min. The 3 experimental groups were radiated 3 times a day from the first pregnant day for consecutively 20 days, and on the 21st day, the fetal rats were taken and then the contents of superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), malondialdehyde (MDA), noradrenaline (NE), dopamine (DA), and 5-hydroxyindole acetic acid (5-HT) in the brain were assayed. Compared with CG, there were significant differences ($P<0.05$) found in the contents of SOD, GSH-Px, and MDA in GM and GH; the contents of SOD and GSH-Px decreased and the content of MDA increased. The significant content differences of NE and DA were found in fetal rat brains in GL and GH groups, with the GL group increased and the GH group decreased. Through this study, we concluded that receiving a certain period of microwave radiation from cellular phones during pregnancy has certain harm on fetal rat brains.

PMID: 22268709 DOI: 10.3109/15368378.2011.624652

[Indexed for MEDLINE]

Format: Abstract

Electromagn Biol Med. 2011 Dec;30(4):253-60. doi: 10.3109/15368378.2011.600167.

Effects of radiofrequency radiation exposure on blood-brain barrier permeability in male and female rats.

Sirav B[1], Seyhan N.

Author information

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Abstract

During the last several decades, numerous studies have been performed aiming at the question of whether or not exposure to radiofrequency radiation (RFR) influences the permeability of the blood-brain barrier (BBB). The objective of this study was to investigate the effect of RFR on the permeability of BBB in male and female Wistar albino rats. Right brain, left brain, cerebellum, and total brain were analyzed separately in the study. Rats were exposed to 0.9 and 1.8 GHz continuous-wave (CW) RFR for 20 min (at SARs of 4.26 mW/kg and 1.46 mW/kg, respectively) while under anesthesia. Control rats were sham-exposed. Disruption of BBB integrity was detected spectrophotometrically using the Evans-blue dye, which has been used as a BBB tracer and is known to be bound to serum albumin. Right brain, left brain, cerebellum, and total brain were evaluated for BBB permeability. In female rats, no albumin extravasation was found in in the brain after RFR exposure. A significant increase in albumin was found in the brains of the RF-exposed male rats when compared to sham-exposed male brains. These results suggest that exposure to 0.9 and 1.8 GHz CW RFR at levels below the international limits can affect the vascular permeability in the brain of male rats. The possible risk of RFR exposure in humans is a major concern for the society. Thus, this topic should be investigated more thoroughly in the future.

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PMID: 21343580

Effects of Cell Phone Radiofrequency Signal Exposure on Brain Glucose Metabolism

Nora D. Volkow, MD, Dardo Tomasi, PhD, Gene-Jack Wang, MD, Paul Vaska, PhD, Joanna S. Fowler, PhD, Frank Telang, MD, Dave Alexoff, BSE, Jean Logan, PhD, and Christopher Wong, MS

Author Affiliations: National Institute on Drug Abuse, Bethesda, Maryland (Dr Volkow); National Institute on Alcohol Abuse and Alcoholism, Bethesda (Drs Volkow, Tomasi, and Telang and Mr Wong); and Medical Department, Brookhaven National Laboratory, Upton, New York (Drs Wang, Vaska, Fowler, and Logan and Mr Alexoff).

Corresponding Author: Nora D. Volkow, MD, National Institute on Drug Abuse, 6001 Executive Blvd, Room 5274, Bethesda, MD 20892 (nvolkow@nida.nih.gov)

Abstract

Context

The dramatic increase in use of cellular telephones has generated concern about possible negative effects of radiofrequency signals delivered to the brain. However, whether acute cell phone exposure affects the human brain is unclear.

Objective

To evaluate if acute cell phone exposure affects brain glucose metabolism, a marker of brain activity.

Design, Setting, and Participants

Randomized crossover study conducted between January 1 and December 31, 2009, at a single US laboratory among 47 healthy participants recruited from the community. Cell phones were placed on the left and right ears and positron emission tomography with (^{18}F)fluorodeoxyglucose injection was used to measure brain glucose metabolism twice, once with the right cell phone activated (sound muted) for 50 minutes ("on" condition) and once with both cell phones deactivated ("off" condition). Statistical parametric mapping was used to compare metabolism between on and off conditions using paired *t* tests, and Pearson linear correlations were used to verify the association of metabolism and estimated amplitude of radiofrequency-modulated electromagnetic waves emitted by the cell phone. Clusters with at least 1000 voxels (volume >8 cm^3) and $P < .05$ (corrected for multiple comparisons) were considered significant.

Brain Res. 2010 Feb 8;1313:232-41. doi: 10.1016/j.brainres.2009.11.079. Epub 2009 Dec 5.

Effect of 835 MHz radiofrequency radiation exposure on calcium binding proteins in the hippocampus of the mouse brain.

Maskey D[1], Kim M, Aryal B, Pradhan J, Choi IY, Park KS, Son T, Hong SY, Kim SB, Kim HG, Kim MJ.

Author information

1 Department of Anatomy, Dankook University College of Medicine, Cheonan-si, San 29, Anseo-Dong, Cheonan, Chungnam, South Korea.

Abstract

Worldwide expansion of mobile phones and electromagnetic field (EMF) exposure has raised question of their possible biological effects on the brain and nervous system. Radiofrequency (RF) radiation might alter intracellular signaling pathways through changes in calcium (Ca(2+)) permeability across cell membranes. Changes in the expression of calcium binding proteins (CaBP) like calbindin D28-k (CB) and calretinin (CR) could indicate impaired Ca(2+)homeostasis due to EMF exposure. CB and CR expression were measured with immunohistochemistry in the hippocampus of mice after EMF exposure at 835 MHz for different exposure times and absorption rates, 1 h/day for 5 days at a specific absorption rate (SAR)=1.6 W/kg, 1 h/day for 5 days at SAR=4.0 W/kg, 5 h/day for 1 day at SAR=1.6 W/kg, 5 h/day for 1 day at SAR=4.0 W/kg, daily exposure for 1 month at SAR=1.6 W/kg. Body weights did not change significantly. CB immunoreactivity (IR) displayed moderate staining of cells in the cornu ammonis (CA) areas and prominently stained granule cells. CR IR revealed prominently stained pyramidal cells with dendrites running perpendicularly in the CA area. Exposure for 1 month produced almost complete loss of pyramidal cells in the CA1 area. CaBP differences could cause changes in cellular Ca(2+)levels, which could have deleterious effect on normal hippocampal functions concerned with neuronal connectivity and integration.

PMID: 19968972 DOI: 10.1016/j.brainres.2009.11.079

[Indexed for MEDLINE]

Format: Abstract

Full text links

ELSEVIER FULL-TEXT ARTICLE

Pathophysiology. 2009 Aug;16(2-3):103-12. doi: 10.1016/j.pathophys.2009.01.001. Epub 2009 Apr 2.

Increased blood-brain barrier permeability in mammalian brain 7 days after exposure to the radiation from a GSM-900 mobile phone.

Nittby H[1], Brun A, Eberhardt J, Malmgren L, Persson BR, Salford LG.

Author information

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Abstract

Microwaves were for the first time produced by humans in 1886 when radio waves were broadcasted and received. Until then microwaves had only existed as a part of the cosmic background radiation since the birth of universe. By the following utilization of microwaves in telegraph communication, radars, television and above all, in the modern mobile phone technology, mankind is today exposed to microwaves at a level up to 10(20) times the original background radiation since the birth of universe. Our group has earlier shown that the electromagnetic radiation emitted by mobile phones alters the permeability of the blood-brain barrier (BBB), resulting in albumin extravasation immediately and 14 days after 2h of exposure. In the background section of this report, we present a thorough review of the literature on the demonstrated effects (or lack of effects) of microwave exposure upon the BBB. Furthermore, we have continued our own studies by investigating the effects of GSM mobile phone radiation upon the blood-brain barrier permeability of rats 7 days after one occasion of 2h of exposure. Forty-eight rats were exposed in TEM-cells for 2h at non-thermal specific absorption rates (SARs) of 0mW/kg, 0.12mW/kg, 1.2mW/kg, 12mW/kg and 120mW/kg. Albumin extravasation over the BBB, neuronal albumin uptake and neuronal damage were assessed. Albumin extravasation was enhanced in the mobile phone exposed rats as compared to sham controls after this 7-day recovery period (Fisher's exact probability test, p=0.04 and Kruskal-Wallis, p=0.012), at the SAR-value of 12mW/kg (Mann-Whitney, p=0.007) and with a trend of increased albumin extravasation also at the SAR-values of 0.12mW/kg and 120mW/kg. There was a low, but significant correlation between the exposure level (SAR-value) and occurrence of focal albumin extravasation (r(s)=0.33; p=0.04). The present findings are in agreement with our earlier studies where we have seen

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ELSEVIER FULL-TEXT ARTICLE

Brain Res. 2010 Oct 14;1356:95-101. doi: 10.1016/j.brainres.2010.07.103. Epub 2010 Aug 4.

Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field.

Sonmez OF[1], Odaci E, Bas O, Kaplan S.

Author information

1 Department of Neurosurgery, Mehmet Aydin Education and Research Hospital, Samsun, Turkey.

Abstract

The biological effects of electromagnetic field (EMF) exposure from mobile phones have growing concern among scientists since there are some reports showing increased risk for human health, especially in the use of mobile phones for a long duration. In the presented study, the effects on the number of Purkinje cells in the cerebellum of 16-week (16 weeks) old female rats were investigated following exposure to 900 MHz EMF. Three groups of rats, a control group (CG), sham exposed group (SG) and an electromagnetic field exposed group (EMFG) were used in this study. While EMFG group rats were exposed to 900 MHz EMF (1h/day for 28 days) in an exposure tube, SG was placed in the exposure tube but not exposed to EMF (1h/day for 28 days). The specific energy absorption rate (SAR) varied between 0.016 (whole body) and 2 W/kg (locally in the head). The CG was not placed into the exposure tube nor was it exposed to EMF during the study period. At the end of the experiment, all of the female rats were sacrificed and the number of Purkinje cells was estimated using a stereological counting technique. Histopathological evaluations were also done on sections of the cerebellum. Results showed that the total number of Purkinje cells in the cerebellum of the EMFG was significantly lower than those of CG ($p<0.004$) and SG ($p<0.002$). In addition, there was no significant difference at the 0.05 level between the rats' body and brain weights in the EMFG and CG or SG. Therefore, it is suggested that long duration exposure to 900 MHz EMF leads to decreases of Purkinje cell numbers in the female rat cerebellum.

PMID: 20691167 DOI: 10.1016/j.brainres.2010.07.103

Format: Abstract

Full text links

ELSEVIER FULL-TEXT ARTICLE

Brain Res. 2009 Apr 10;1265:178-85. doi: 10.1016/j.brainres.2009.02.011. Epub 2009 Feb 20.

900 MHz electromagnetic field exposure affects qualitative and quantitative features of hippocampal pyramidal cells in the adult female rat.

Bas O[1], Odaci E, Kaplan S, Acer N, Ucok K, Colakoglu S.

Author information

1 Department of Anatomy, Rize University School of Medicine, Rize, Turkey.

Abstract

The effects of electromagnetic fields (EMFs) emitted by mobile phones on humans hold special interest due to their use in close proximity to the brain. The current study investigated the number of pyramidal cells in the cornu ammonis (CA) of the 16-week-old female rat hippocampus following postnatal exposure to a 900 megahertz (MHz) EMF. In this study were three groups of 6 rats: control (Cont), sham exposed (Sham), and EMF exposed (EMF). EMF group rats were exposed to 900 MHz EMF (1 h/day for 28 days) in an exposure tube. Sham group was placed in the exposure tube but not exposed to EMF (1 h/day for 28 days). Cont group was not placed into the exposure tube nor were they exposed to EMF during the study period. In EMF group rats, the specific energy absorption rate (SAR) varied between 0.016 (whole body) and 2 W/kg (locally in the head). All of the rats were sacrificed at the end of the experiment and the number of pyramidal cells in the CA was estimated using the optical fractionator technique. Histopathological evaluations were made on sections of the CA region of the hippocampus. Results showed that postnatal EMF exposure caused a significant decrease of the pyramidal cell number in the CA of the EMF group ($P<0.05$). Additionally, cell loss can be seen in the CA region of EMF group even at qualitative observation. These results may encourage researchers to evaluate the chronic effects of 900 MHz EMF on teenagers' brains.

PMID: 19230827 DOI: 10.1016/j.brainres.2009.02.011

[Indexed for MEDLINE]

Format: Abstract

Full text links

SAGE journals

Toxicol Ind Health. 2009 Jul;25(6):377-84. doi: 10.1177/0748233709106442.

Chronic prenatal exposure to the 900 megahertz electromagnetic field induces pyramidal cell loss in the hippocampus of newborn rats.

Bas O[1], Odaci E, Mollaoglu H, Ucok K, Kaplan S.

Author information

1 Department of Anatomy, Rize University School of Medicine, Rize, Turkey.

Abstract

Widespread use of mobile phones which are a major source of electromagnetic fields might affect living organisms. However, there has been no investigation concerning prenatal exposure to electromagnetic fields or their roles in the development of the pyramidal cells of the cornu ammonis in postnatal life. Two groups of pregnant rats, a control group and an experimental group, that were exposed to an electromagnetic field were used. For obtaining electromagnetic field offspring, the pregnant rats were exposed to 900 megahertz electromagnetic fields during the 1-19th gestation days. There were no actions performed on the control group during the same period. The offspring rats were spontaneously delivered--control group (n = 6) and electromagnetic field group (n = 6). Offspring were sacrificed for stereological analyses at the end of the 4th week. Pyramidal cell number in rat cornu ammonis was estimated using the optical fractionator technique. It was found that 900 megahertz of electromagnetic field significantly reduced the total pyramidal cell number in the cornu ammonis of the electromagnetic field group ($P < 0.001$). Therefore, although its exact mechanism is not clear, it is suggested that pyramidal cell loss in the cornu ammonis could be due to the 900 megahertz electromagnetic field exposure in the prenatal period.

PMID: 19671630 DOI: 10.1177/0748233709106442

[Indexed for MEDLINE]

MeSH terms

Format: Abstract

Full text links

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Int J Radiat Biol. 2009 Aug;85(8):680-9. doi: 10.1080/09553000903009530.

Modulator effects of L-carnitine and selenium on wireless devices (2.45 GHz)-induced oxidative stress and electroencephalography records in brain of rat.

Naziroğlu M[1], Gümral N.

Author information

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Abstract

PURPOSE: Electromagnetic radiation (EMR) from wireless devices may affect biological systems by increasing free radicals. The present study was designed to determine the effects of 2.45 GHz EMR on the brain antioxidant redox system and electroencephalography (EEG) records in rat. The possible protective effects of selenium and L-carnitine were also tested and compared to untreated controls.

MATERIALS AND METHODS: Thirty rats were equally divided into five different groups, namely Group A(1): Cage control, Group A(2): Sham control, group B: 2.45 GHz EMR, group C: 2.45 GHz EMR + selenium, group D: 2.45 GHz EMR + L-carnitine. Groups B, C and D were exposed to 2.45 GHz EMR during 60 min/day for 28 days. End of the experiments, EEG records and the brain cortex samples were taken.

RESULTS: The cortex brain vitamin A ($p < 0.05$), vitamin C ($p < 0.01$) and vitamin E ($p < 0.05$) concentrations values were lower in group B than in group A1 and A2 although their concentrations were increased by selenium and L-carnitine supplementation. Lipid peroxidation, levels were lower in group C ($p < 0.05$) and D ($p < 0.01$) than in group B where as reduced glutathione levels were higher in group C ($p < 0.05$) than in group A1, A2 and B. However, B-carotene levels did not change in the five groups.

CONCLUSIONS: L-carnitine and selenium seem to have protective effects on the 2.45 GHz-induced decrease of the vitamins by supporting antioxidant redox system. L-carnitine on the vitamin concentrations seems to more protective affect than in selenium.

PMID: 19637079 DOI: 10.1080/09553000903009530

Electromagn Biol Med. 2009;28(2):215-22.

Blood-brain barrier disruption by continuous-wave radio frequency radiation.

Sirav B[1], Seyhan N.

Author information

1 Department of Biophysics, Faculty of Medicine, Gazi University, Gazi Non-Ionizing Radiation Protection Center, 06510 Ankara, Turkey. bahriyes@gazi.edu.tr

Abstract

The increasing use of cellular phones and the increasing number of associated base stations are becoming a widespread source of non ionizing electromagnetic radiation. Some biological effects are likely to occur even at low-level EM fields. This study was designed to investigate the effects of 900 and 1,800 MHz Continuous Wave Radio Frequency Radiation (CW RFR) on the permeability of Blood Brain Barrier (BBB) of rats. Results have shown that 20 min RFR exposure of 900 and 1,800 MHz induces an effect and increases the permeability of BBB of male rats. There was no change in female rats. The scientific evidence on RFR safety or harm remains inconclusive. More studies are needed to demonstrate the effects of RFR on the permeability of BBB and the mechanisms of that breakdown.

PMID: 19811403 DOI: 10.1080/15368370802608738

[Indexed for MEDLINE]

Brain Res. 2008 Oct 31;1238:224-9. doi: 10.1016/j.brainres.2008.08.013. Epub 2008 Aug 16.

Effects of prenatal exposure to a 900 MHz electromagnetic field on the dentate gyrus of rats: a stereological and histopathological study.

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1 Department of Histology and Embryology, Karadeniz Technical University School of Medicine, Trabzon, Turkey. eodaci@yahoo.com

Abstract

Electromagnetic fields (EMFs) inhibit the formation and differentiation of neural stem cells during embryonic development. In this study, the effects of prenatal exposure to EMF on the number of granule cells in the dentate gyrus of 4-week-old rats were investigated. This experiment used a control (Cont) group and an EMF exposed (EMF) group (three pregnant rats each group). The EMF group consisted of six offspring (n=6) of pregnant rats that were exposed to an EMF of up to 900 megahertz (MHz) for 60 min/day between the first and last days of gestation. The control group consisted of five offspring (n=5) of pregnant rats that were not treated at all. The offspring were sacrificed when they were 4 weeks old. The numbers of granule cells in the dentate gyrus were analyzed using the optical fractionator technique. The results showed that prenatal EMF exposure caused a decrease in the number of granule cells in the dentate gyrus of the rats ($P<0.01$). This suggests that prenatal exposure to a 900 MHz EMF affects the development of the dentate gyrus granule cells in the rat hippocampus. Cell loss might be caused by an inhibition of granule cell neurogenesis in the dentate gyrus.

PMID: 18761003 DOI: 10.1016/j.brainres.2008.08.013

[Indexed for MEDLINE]

MeSH terms

Format: Abstract

Full text links

ELSEVIER FULL-TEXT ARTICLE

Differentiation. 2002 May;70(2-3):120-9.

Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: molecular mechanism for cancer- and blood-brain barrier-related effects.

Leszczynski D[1], Joenväärä S, Reivinen J, Kuokka R.

Author information

1 Bio-NIR Research Group, Radiobiology Laboratory, Department of Research and Environmental Surveillance, STUK - Radiation and Nuclear Safety Authority, Laippatie 4, FIN-00880, Helsinki, Finland. dariusz.leszczynski@stuk.fi

Abstract

We have examined whether non-thermal exposures of cultures of the human endothelial cell line EA.hy926 to 900 MHz GSM mobile phone microwave radiation could activate stress response. Results obtained demonstrate that 1-hour non-thermal exposure of EA.hy926 cells changes the phosphorylation status of numerous, yet largely unidentified, proteins. One of the affected proteins was identified as heat shock protein-27 (hsp27). Mobile phone exposure caused a transient increase in phosphorylation of hsp27, an effect which was prevented by SB203580, a specific inhibitor of p38 mitogen-activated protein kinase (p38MAPK). Also, mobile phone exposure caused transient changes in the protein expression levels of hsp27 and p38MAPK. All these changes were non-thermal effects because, as determined using temperature probes, irradiation did not alter the temperature of cell cultures, which remained throughout the irradiation period at 37 +/- 0.3 degrees C. Changes in the overall pattern of protein phosphorylation suggest that mobile phone radiation activates a variety of cellular signal transduction pathways, among them the hsp27/p38MAPK stress response pathway. Based on the known functions of hsp27, we put forward the hypothesis that mobile phone radiation-induced activation of hsp27 may (i) facilitate the development of brain cancer by inhibiting the cytochrome c/caspase-3 apoptotic pathway and (ii) cause an increase in blood-brain barrier permeability through stabilization of endothelial cell stress fibers. We postulate that these events, when occurring repeatedly over a long period of time, might become a health hazard because of the

Testimony to Santa Rosa City Council December 10, 2019
Study Session on Wireless Facilities

Rec'd at Meeting 12/10/19
Item No. 31
From: Catherine Dodd

Catherine Dodd PhD, RN
5259 Carriage Lane Santa Rosa, CA 95403

Good Afternoon Mayor Schwedhelm, Vice Mayor Fleming, and Members: Sawyer, Rogers, Olivares, and Tibbetts.

I live just outside the City boundaries in Wikiup, but I spend much time in the City proper as a local shopper, library visitor, and caretaker of people with terminal illness who live in this beautiful City.

I would like to start by saying thank you for your attention to the well-being of Santa Rosa residents and visitors especially during the challenges from the Tubbs fire and the Kincade fire. I will come back to that.

I am a Registered Nurse with a PhD in Sociology emphasis on Health Policy. I have worked in the legislative and executive branch of government at the local and federal level for over 35 years. I greatly respect the commitment you bring to your elected position.

In the early 80s I was working for a member of the San Francisco Board of Supervisors. A strange disease began to affect members of the gay community. It was the beginning of the AIDs epidemic. Like perhaps many people here I lost friends and colleagues. I thought that would be the most significant public health crisis I would experience in my career.

I was wrong. The health effects of wireless Radio Frequency radiation are an invisible threat growing in exposure every single day. This is larger than lead and asbestos (which we are still remediating), larger than pesticides like DDT, larger than smoking. All these previous epidemics took 7-10 years before health damage was detected.

You received lots of factual science, it's been sent to you by residents and experts. Much has been presented here today and I would like to associate myself with those remarks.

Catherine Dodd Attachments

Jacobs University Press Release on Replication Study Showing Radiofrequency fields enhance cancer tumor growth March 6, 2015

Purpose: To evaluate putative effects on tumour susceptibility in mice exposed to a UMTS (universal mobile telecommunications system) test signal for up to 24 months, commencing with embryo-fetal exposure.

Material and methods: Animals were exposed to UMTS fields with intensities of 0, 4.8, and 48 W/m^2, the low-dose group (4.8 W/m^2) was subjected to additional prenatal ethylnitrosourea treatment (40 mg ENU/kg body weight).

Results: The high-level UMTS exposure (48 W/m^2), the sham exposure, and the cage control groups showed comparable tumour incidences in the protocol organs. In contrast, the ENU-treated group UMTS-exposed at 4.8 W/m^2 displayed an enhanced lung tumour rate and an increased incidence of lung carcinomas as compared to the controls treated with ENU only. Furthermore, tumour multiplicity of the lung carcinomas was increased and the number of metastasising lung tumours was doubled in the ENU/UMTS group as compared to the ENU control group.

Conclusion: This pilot study indicates a cocarcinogenic effect of lifelong UMTS exposure (4.8 W/m^2) in female B6C3F1 descendants subjected to pretreatment with ethylnitrosourea.

ELSEVIER

Biochemical and Biophysical Research Communications

Volume 459, Issue 4, 17 April 2015, Pages 585-590

Rec'd at Meeting 12/10/19
Item No. ~~12/9/19~~ 3.1
From: Gerald Camarata

Gerald Camarata, MD
2345 Brush Creek Rd
Santa Rosa CA 95404

This letter constitutes statements of fact to be placed into the public record regarding the serious adverse health effects of enhanced 4G and 5G cellphone technology, specifically close proximity microwave radiation antennas (CPMRA)

Dear Mayor Schwedhelm and Santa Rosa City Council Members: Victoria Fleming, John Sawyer, Chris Rogers, Ernesto Olivares, Jack Tlbbets,

I am writing both as a concerned citizen as well as a concerned public servant, with regards to the proposed permitting of 100 close proximity microwave radiation antennas (CPMRA) in Santa Rosa. I am a Family Physician who works in our community health clinic system and have been in practice now for over 25 years in Sonoma County.

Wireless radiation has biologic effects. Period. This is no longer a subject of debate when one looks at PubMed (online library of all medical research) and the peer reviewed literature on the topic. These effects are on all life forms: plants, animals, insects, microbes. In humans, we now have clear evidence of cancer, with causality essentially established. Growing evidence links wireless radiation to DNA damage, neuropsychiatric effects, cardiomyopathy leading to congestive heart failure and diabetes mellitus leading to renal failure and need for dialysis. So 5G is not a conversation about whether these biologic effects exist, they clearly do. 5G is conversation about unsustainable health care expenditures.

Why do I say this? The data on the adverse affects of wireless radio frequency has been accumulating for decades now, this with virtually no industry or public health oversight of the developing technology. In essence we have been sitting on the data (sound familiar: think climate change). We are, at the same time, now seeing epidemics in our public health; of diabetes, mental health disorders and suicide, as well as increasing cancer clusters in close proximity to cell towers. Peer reviewed literature shows a direct correlation between proximity to cell towers and elevation of blood sugar as measured by Hemaglobin A1C, the clinical measurement tool we use to monitor diabetes in our patients. Indeed the established mechanism to induce diabetes in lab rats is to expose them to 2.4 gigahertz of radiation, short term. With 1 in 3 children (and 1 in 2 Latina females) expected to develop diabetes mellitus in their lifetime, the implications of pervasive 5G small cell towers in close proximity to virtually everyone in the city, are profound.
In short, 5G generally speaking,, and CPMRA in Santa Rosa in particular, is an untested application of a technology we know to have harmful effects on human health. In academic medicine this is referred to as "human subjects research," a very tightly regulated form of research where at a minimum the subjects are given full informed consent of risks and benefits of research, and a governing body of experts have come

to a consensus that the research project is overall safe to perform. I see nothing close to resembling this level of oversight of this proposed project.

As City Council members you have taken an oath to protect the public health and safety of our community. There exists at present no gap in cellphone service in Santa Rosa. Are you willing to trade-off additional ease of downloading movies or facilitating the Internet of Things (IoT) versus the harm to public health which will surely occur with additional wireless communication facilities? In closing, I urge you to declare all pending applications for additional CPRMA's null and void and revise the City's Telecommunications Ordinance to prevent these facilities from locating in residential areas, near hospitals, schools, parks and other areas of high population density and be subject to NEPA as required by recent federal court decisions.

Sincerely,

Gerry Camarata, MD

Rec'd at Meeting 12/10/19
Item No. 3.
From: Martin Miller

To: Santa Rosa City Council et al

From: Martin Miller, M.Ac, LAc

10 December 2019

I attest and affirm that the following statements are true, accurate and within my personal knowledge. My name is Martin Miller. I am a licensed Acupuncturist and Licensed Health Insurance Broker and I work and live just over the Border of Santa Rosa Road. I spend a great deal of my time visiting and serving customers in the Santa Rosa area.

There is a growing body of undisputed research establishing a direct causal relationship between Cell Tower Radio Frequency Microwave Transmissions with markedly increased occurrences of Cancer in the population living adjacent to them.

Here is just a short sampling of the finds from a variety of studies conducted worldwide:

Long Term exposure to microwave radiation provokes cancer growth: evidence from radars and mobile communication systems stated "Even a year of operation of a powerful base transmitting station for mobile communication reportedly resulted in a dramatic increase of cancer incidence among population living nearby"

Mortality by neoplasia and cellular telephone base stations stated "This 10 year study on cell phone antennas by the Municipal Health Department of Belo Horizonte and several universities in Brazil found a clearly elevated relative risk of cancer mortality at the residential distances of 500 meters or less from cell phone transmission towers."

Epidemiological Evidence for a Health Risk from Mobile Phone Base Stations stated " eight of the 10 studies (from 7 different countries) reported increased prevalence of adverse neurobehavioral symptom or cancer in populations living at distances less than 500 meters from base stations.

None of the studies reported exposure above accepted international guidelines, suggesting that current guidelines may be inadequate in protecting the health of human populations"

Ramazzini Institute large scale study: "Lab animals exposed to environmental levels (comparable to allowable limits from cell towers) of RF Radiation and found the rats developed increased cancers-schwannoma of the heart in male rates. This study confirms the $25 million **US National Toxicology Program**... also reported finding the same unusual cancers as the Ramazzini-

In addition, this Ramazzini study of cell tower radiation also found increases in malignant brain (glial) tumors in female rates and precancerous conditions including Schwann cells hyperplasia in both male and female rates

Increase Incidence of Cancer Near a Cell-phone Transmitter Station from the *Journal of Cancer Prevention* (Israel) April 2004 attached herein states " a significant higher rate of cancer (300% increase) among all resident living with 300 meters radius of a mobile phone mast for between three and seven years was detected. There was a 900% increase among women alone

The current plans for cell towers have placed them a mere tens of meters from homes, which will result in devastating consequences for the health and well being of Santa Rosa residents.

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,

_____

Martin Miller

1. https://www.ncbi.nlm.nih.gov/pubmed/21716201
2. https://www.sciencedirect.com/science/article/pii/S0048969711005754
3. https://www.researchgate.net/publication/45387389_Epidemiological_Evidence_for_a_Health_Risk_from_Mobile_Phone_Base_Stations
4. https://ehtrust.org/wp-content/uploads/Belpoggi-Heart-and-Brain-Tumors-Base-Station-2018-First-page-.pdf
5. https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr595_508.pdf
6. https://www.semanticscholar.org/paper/INCREASED-INCIDENCE-OF-CANCER-NEAR-A-CELL-PHONE-Wolf-Wolf/ce35fbdfa7b67b0dafd574a1e04fe3cc1f2ec7de
7. https://www.sciencedirect.com/science/article/abs/pii/S0013935118303475
8. https://www.researchgate.net/publication/233593841_Biological_effects_from_exposure_to_electromagnetic_radiation_emitted_by_cell_tower_base_stations_and_other_antenna_arrays

Compilation Of Research Studies On Cell Tower Radiation And Health

What Does the Published Research Say About Cell Tower Radiation and Health

American Academy of Pediatrics Website

"Electromagnetic Fields: A Hazard to Your Health?" on Cell Tower Radiation

"In recent years, concern has increased about exposure to radio frequency electromagnetic radiation emitted from cell phones and phone station antennae. An Egyptian study confirmed concerns that living nearby mobile phone base stations increased the risk for developing:

- Headaches
- Memory problems
- Dizziness
- Depression
- Sleep problems

Short-term exposure to these fields in experimental studies have not always shown negative effects, but this does not rule out cumulative damage from these fields, so larger studies over longer periods are needed to help understand who is at risk. In large studies, an association has been observed between symptoms and exposure to these fields in the everyday environment."

–American Academy of Pediatrics
(https://www.healthychildren.org/English/safety-prevention/all-around/Pages/Electromagnetic-Fields-A-Hazard-to-Your-Health.aspx)


CELL PHONE FINE PRINT WARNINGS
(https://ehtrust.org/key-issues/fine-print-warnings/)


CELL PHONE RADIATION FAQ'S
(https://ehtrust.org/take-action/educate-yourself/cell-phones-and-wireless-radiation-faqs/)


WIFI IN SCHOOLS
(https://ehtrust.org/key-issues/wifi-in-schools/)


CELL PHONES AND BREAST CANCER
(https://ehtrust.org/key-issues/cell-phones-and-breast-cancer/)

Compilation of Research Studies on Cell Tower Radiation and Health

Anthony B. Miller, L. Lloyd Morgan, Iris Udasin, Devra Lee Davis, Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102) (https://www.sciencedirect.com/science/article/pii/S0013935118303475), *Environmental Research*, Volume 167, 2018, Pages 673-683, ISSN 0013-9351

Radiofrequency radiation is emitted by cell towers. This review paper concludes that "Based on the evidence reviewed it is our opinion that IARC's current categorization of RFR as a possible human carcinogen (Group 2B) should be upgraded to Carcinogenic to Humans (Group 1)."

Zothansiama, et al. "Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations." (http://www.tandfonline.com/doi/abs/10.1080/15368378.2017.1350584) Electromagnetic Biology and Medicine 36.3 (2017): 295-305.

- This study evaluated effects in the human blood of individuals living near mobile phone base stations (within 80 meters) compared with healthy controls (over 300 meters). The study found higher radiofrequency radiation exposures and statistically significant differences in the blood of people living closer to the cellular antennas. The group living closer to the antennas had for example, statistically significant higher frequency of micronuclei and a rise in lipid peroxidation in their blood. These changes are considered biomarkers predictive of cancer.

Meo, S. A., Almahmoud, M., Alsultan, Q., Alotaibi, N., Alnajashi, I., & Hajjar, W. M. (2018). Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students' Cognitive Health. (https://www.ncbi.nlm.nih.gov/pubmed/?term=Mobile+Phone+Base+Station+Tower+Settings+Adjacent+to+School+Buildings%3A+Impact+on+Students%E2%80%99+Cognitive+Health) *American Journal of Men's Health*.

- High exposure to RF-EMF produced by mobile phone base station towers was associated with delayed fine and gross motor skills, spatial working memory, and attention in school adolescents compared to students who were exposed to low RF-EMF.

Long-term exposure to microwave radiation provokes cancer growth: evidences from radars and mobile communication systems. (https://www.ncbi.nlm.nih.gov/pubmed/21716201) Yakymenko (https://www.ncbi.nlm.nih.gov/pubmed?term=Yakymenko%20I%5BAuthor%5D&cauthor=true&cauthor_uid=21716201) (2011) Exp Oncology, 33(2):62-70.

- Even a year of operation of a powerful base transmitting station for mobile communication reportedly resulted in a dramatic increase of cancer incidence among population living nearby.

Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations (MPBS)with Glycated Hemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus (https://www.researchgate.net/publication/283726472_Association_of_Exposure_to_Radio-Frequency_Electromagnetic_Field_Radiation_RF-EMFR_Generated_by_Mobile_Phone_Base_Stations_with_Glycated_Hemoglobin_HbA1c_and_Risk_of_Type_2_Diabetes_Mellitus) , Sultan Ayoub Meo et al, International Journal of Environmental Research and Public Health, 2015

- Elementary school students who were exposed to high RF-EMFR generated by MPBS had a significantly higher risk of type 2 diabetes mellitus relative to their counterparts who were exposed to lower RF-EMFR.

Neurobehavioral effects among inhabitants around mobile phone base stations (https://www.ncbi.nlm.nih.gov/pubmed/16962663) Abdel-Rassoul et al, Neurotoxicology, 2007

- This study found that living nearby mobile phone base stations (cell antennas) increased the risk for neuropsychiatric problems such as headaches, memory problems, dizziness, tremors,depression, sleep problems and some changes in the performance of neurobehavioral functions.

Meo SA, Almahmoud M, Alsultan Q, Alotaibi N, Alnajashi I, Hajjar WM, Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students' Cognitive Health. (https://www.ncbi.nlm.nih.gov/pubmed/?term=Mobile+Phone+Base+Station+Tower+Settings+Adjacent+to+School+Buildings%3A+Impact+on+Students&fbclid=IwAR129y1Degcg1-5HWkRLZksYW1ihzP15iMZ2knctvTKJVU7w2NS9QDIqOIk) Am J Mens Health. 2018 Dec 7:1557988318816914. doi: 10.1177/1557988318816914.

- This study investigated the impact of exposure to radiofrequency electromagnetic field (RF-EMF) radiation generated by mobile phone base station towers (MPBSTs) on cognitive functions. Two hundred and seventeen volunteer male students aged between 13 and 16 registered from two different intermediate schools: 124 students were from School 1 and 93 students were from School 2. The MPBSTs were located within 200 m from the schoolbuildings. In School 1, RF-EMF was 2.010 μW/cm2 with a frequency of 925 MHz and in School 2, RF-EMF was 10.021 μW/cm2 with a frequency of 925 MHz. Students were exposed to EMFR for 6 hr a day, 5 days a week for a total period of 2 years. The Narda Safety Test Solution device SRM-3006 was used to measure RF-EMF in both schools, and cognitive functions tasks were measured by the Cambridge Neuropsychological Test Automated Battery (CANTAB). Significant impairment in Motor Screening Task (MOT; p = .03) and Spatial Working Memory (SWM) task (p = .04) was identified among the group of students who were exposed to high RF-EMF produced by MPBSTs. High exposure to RF-EMF produced by MPBSTs was associated with delayed fine and gross motor skills, spatial working memory, and attention in school adolescents compared to students who were exposed to low RF-EMF.

Biological Effects from Exposure to Electromagnetic Radiation Emitted by Cell Tower Base Stations and Other Antenna Arrays (https://www.researchgate.net/publication/233593841_Biological_effects_from_exposure_to_electromagnetic_radiation_emitted_by_cell_tc Levitt & Lai, Environmental Reviews, 2010

- This review of 100 studies found approximately 80% showed biological effects near towers. "Both anecdotal reports and some epidemiology studies have found headaches, skin rashes, sleep disturbances, depression, decreased libido, increased rates of suicide, concentration problems, dizziness, memory changes, increased risk of cancer, tremors, and other neurophysiological effects in populations near base stations."

Mortality by neoplasia and cellular telephone base stations. (https://www.sciencedirect.com/science/article/pii/S0048969711005754) Dode et al. (Brazil), Science of the Total Environment, Volume 409, Issue 19, 1 September 2011, Pages 3649–3665

- This 10 year study on cell phone antennas by the Municipal Health Department in Belo Horizonte and several universities in Brazil found a clearly elevated relative risk of cancer mortality at residential distances of

500 meters or less from cell phone transmission towers. Shortly after this study was published, the city prosecutor sued several cell phone companies and requested that almost half of the cities antennas be removed. Many antennas were dismantled.

Epidemiological Evidence for a Health Risk from Mobile Phone Base Stations (https://www.researchgate.net/publication/45387389_Epidemiological_evidence_for_a_health_risk_from_mobile_phone_base_stations) Khurana, Hardell et al., International Journal of Occupational Environmental Health, Vol 16(3):263-267, 2010

- A review of 10 epidemiological studies that assessed for negative health effects of mobile phone base stations (4 studies were from Germany, and 1 each from Austria, Egypt, France, Israel, Poland, Spain) found that seven showed altered neurobehavioral effects near cell tower and three showed increased cancer incidence.

The review also found that eight of the 10 studies reported increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances < 500 meters from base stations. None of the studies reported exposure above accepted international guidelines, suggesting that current guidelines may be inadequate in protecting the health of human populations.

Health effects of living near mobile phone base transceiver station (BTS) antennae: a report from Isfahan, Iran (https://www.ncbi.nlm.nih.gov/pubmed/23781985). Shahbazi-Gahrouei et al, Electromagnetic Biology Medicine, 2013.

- This cross-sectional study found the symptoms of nausea, headache, dizziness, irritability, discomfort, nervousness, depression, sleep disturbance, memory loss and lowering of libido were statistically increased in people living closer than 300 m from cell antennas as compared to those living farther away. The study concludes that "antennas should not be sited closer than 300 m to people to minimize exposure."

How does long term exposure to base stations and mobile phones affect human hormone profiles? (https://www.ncbi.nlm.nih.gov/pubmed/22138021) Eskander EF et al, (2011), Clin Biochem

- RFR exposures significantly impacted ACTH, cortisol, thyroid hormones, prolactin for females, and testosterone levels for males.

Investigation on the health of people living near mobile telephone relay stations: Incidence according to distance and sex (https://www.ncbi.nlm.nih.gov/pubmed/12168254) Santini et al, 2002 , Pathol Bio

- People living near mobile phone masts reported more symptoms of headache, sleep disturbance, discomfort, irritability, depression, memory loss and concentration problems the closer they lived to the installation. Study authors recommend that the minimal distance of people from cellular phone base stations should not be < 300 m.

Navarro EA, Segura J, Portoles M, Gomez-Perretta C, The Microwave Syndrome: A preliminary Study (http://www.emrpolicy.org/science/research/docs/navarro_ebm_2003.pdf). 2003 (Spain) Electromagnetic Biology and Medicine, Volume 22, Issue 2, (2003): 161 – 169

- Statistically significant positive exposure-response associations between RFR intensity and fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorder, depressive tendency, feeling of discomfort, difficulty in concentration, loss of memory, visual disorder, dizziness and cardiovascular problems.

Two Important Animal Studies on Radiofrequency Radiation

These studies indicate that government limits are non protective. Government limits are based on the assumption that radiofrequency radiation is only harmful at thermal levels. However, the cancers developed in animals in these studies at radiation levels that were non thermal.

Belpoggi et al. 2018, "Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz base station environmental emission (https://ehtrust.org/wp-content/uploads/Belpoggi-Heart-and-Brain-Tumors-Base-Station-2018-First-page-.pdf)" Environmental Research Journal

- Researchers with the renowned Ramazzini Institute (RI) in Italy performed a large-scale lifetime study (https://www.sciencedirect.com/science/article/pii/S0013935118300367?via%3Dihub) of lab animals exposed to environmental levels (comparable to allowable limits from cell towers) of RFR radiation and found the rats developed increased cancers- schwannoma of the heart in male rats. This study confirms the $25 million US National Toxicology Program (https://ntp.niehs.nih.gov/about/org/sep/trpanel/meetings/docs/2018/march/index.html) study which used much higher levels of cell phone radiofrequency (RF) radiation, but also reported finding the same unusual cancers as the Ramazzini- schwannoma of the heart in male rats. In addition, the RI study of cell tower radiation also found increases in malignant brain (glial) tumors in female rats and precancerous conditions including Schwann cells hyperplasia in both male and female rats.
- "Our findings of cancerous tumors in rats exposed to environmental levels of RF are consistent with and reinforce the results of the US NTP studies on cell phone radiation, as both reported increases in the same types of tumors of the brain and heart in Sprague-Dawley rats. Together, these studies provide sufficient evidence to call for the International Agency for Research on Cancer (IARC) to re-evaluate and re-classify their conclusions regarding the carcinogenic potential of RFR in humans," said Fiorella Belpoggi PhD, study author and RI Director of Research.
- The Ramazzini study exposed 2448 Sprague-Dawley rats from prenatal life until their natural death to "environmental" cell tower radiation for 19 hours per day (1.8 GHz GSM radiofrequency radiation (RFR) of 5, 25 and 50 V/m). RI exposures mimicked base station emissions like those from cell tower antennas, and exposure levels were far less than those used in the NTP studies of cell phone radiation.
- Watch Press Conference (https://ehtrust.org/worlds-largest-animal-study-on-cell-tower-radiation-confirms-cancer-link/)

Wyde, Michael, et al. "National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure).Statement on conclusions of the peer review meeting by NIEHS, released after external peer review meeting (https://ntp.niehs.nih.gov/ntp/about_ntp/trpanel/2018/march/actions20180328_508.pdf) and the DNA damage presentation (https://ehtrust.org/wp-content/uploads/Evaluation-of-Genotoxicity-of-Cell-Phone-Radiofrequency-Radiation-in-Male-and-f-the-Genot-d-Female-notoxicity-e-Rats-and-y-Ce-d-Mice-ell-Ra-e-Following-g-Subchronic-ncy-c-Exposure-Poster-.pdf).

- This 25 million dollar study is the most complex study completed by the NTP and the world's largest rodent study on radiofrequency radiation exposure to date which found long term exposure at non thermal levels associated with brain cancer and schwannomas of the heart in male rats. In addition damage to heart was found in all exposure levels. The full report is expected to be released in Fall 2018.

More Important Studies on Cell Tower Radiation

Cindy L. Russell, 5 G wireless telecommunications expansion: Public health and environmental implications (https://www.sciencedirect.com/science/article/pii/S0013935118300161), Environmental Research, 2018, ISSN 0013-9351

- Radiofrequency radiation (RF) is increasingly being recognized as a new form of environmental pollution (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-pollution). This article reviews relevant electromagnetic (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/electromagnetism) frequencies, exposure standards and current scientific literature on the health implications of 2G, 3G, 4G and 5G.
- Effects can also be non-linear. Because this is the first generation to have cradle-to-grave lifespan exposure to this level of man-made microwave (RF EMR) radiofrequencies, it will be years or decades before the true health consequences are known. Precaution in the roll out of this new technology is strongly indicated.

Noa Betzalel, Paul Ben Ishai, Yuri Feldman, The human skin as a sub-THz receiver – Does 5G pose a danger to it or not? (https://www.sciencedirect.com/science/article/pii/S0013935118300331), Environmental Research, Volume 163, 2018, Pages 208-216, ISSN 0013-9351,

- Researchers have developed a unique simulation tool of human skin, taking into account the skin multi-layer structure (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/laminates) together with the helical segment of the sweat duct embedded in it. They found that the presence of the sweat duct led to a high specific absorption rate (SAR) of the skin in extremely high frequency (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/extremely-high-frequencies) band that will be used in 5G. "One must consider the implications of human immersion in the electromagnetic noise, caused by devices working at the very same frequencies as those, to which the sweat duct (as a helical antenna) is most attuned. We are raising a warning flag against the unrestricted use of sub-THz technologies for communication, before the possible consequences for public health are explored."

Mobile phone infrastructure regulation in Europe: Scientific challenges and human rights protection (https://www.sciencedirect.com/science/article/pii/S146290111300186X) Claudia Roda, Susan Perry, Environmental Science & Policy, Volume 37, March 2014, Pages 204-214.

- This article was published in Environmental Science & Policy by human rights experts. It argues that cell tower placement is a human rights issue for children.
- "We argue that (1) because protection of children is a high threshold norm in Human Right law and (2) the binding language of the Convention on the Rights of the Child obliges States Parties to provide a higher standard of protection for children than adults, any widespread or systematic form of environmental pollution that poses a long-term threat to a child's rights to life, development or health may constitute an international human rights violation.
- In particular we have explained how the dearth of legislation to regulate the installation of base stations (cell towers) in close proximity to children's facilities and schools clearly constitutes a human rights concern according to the language of the Convention on the Rights of the Child, a treaty that has been ratified by all European States.

SAFETY ZONE DETERMINATION FOR WIRELESS CELLULAR TOWER (http://ijret.org/Volumes/V02/I09/IJRET_110209029.pdf) Nyakyi et al, Tanzania (2013)

- This research looked at the radiation that cell towers emit and states a safety zone is needed around the towers to ensure safe sleeping areas. The authors state that "respective authorities should ensure that people reside far from the tower by 120m or more depending on the power transmitted to avoid severe health effect."

A cross-sectional case control study on genetic damage in individuals residing in the vicinity of a mobile phone base station. (https://www.ncbi.nlm.nih.gov/pubmed/25006864) Ghandi et al, 2014 (India):

- This cross-sectional case control study on genetic damage in individuals living near cell towers found genetic damage parameters of DNA were significantly elevated. The authors state," The genetic damage evident in the participants of this study needs to be addressed against future disease-risk, which in addition to neurodegenerative disorders, may lead to cancer."

Human disease resulting from exposure to electromagnetic fields (https://www.ncbi.nlm.nih.gov/pubmed/24280284), Carpenter, D. O. Reviews on Environmental Health, Volume 28, Issue 4, Pages 159172.

- This review summarizes the evidence stating that excessive exposure to magnetic fields from power lines and other sources of electric current increases the risk of development of some cancers and neurodegenerative diseases, and that excessive exposure to RF radiation increases risk of cancer, male infertility, and neurobehavioral abnormalities.

Signifikanter Rückgang klinischer Symptome nach Senderabbau – eine Interventionsstudie. (English-Significant Decrease of Clinical Symptoms after Mobile Phone Base Station Removal – An Intervention Study)

(http://nebula.wsimg.com/d1e65ba8eb587c44cba6164dfef44ed2?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1)Tetsuharu Shinjyo and Akemi Shinjyo, 2014 Umwelt-Medizin-Gesellschaft, 27(4), S. 294-301.

- Japanese study Showed Statistically Significant Adverse Health Effects from electromagnetic radiation from mobile phone base stations. Residents of a condominium building that had cell tower antennas on the rooftop were examined before and after cell tower antennas were removed. In 1998, 800MHz cell antennas were installed, then later in 2008 a second set of antennas (2GHz) were installed. Medical exams and interviews were conducted before and after the antennas were removed in 2009 on 107 residents of the building who had no prior knowledge about possible. These results lead researchers to question the construction of mobile phone base stations on top of buildings such as condominiums or houses.

Effect of GSTM1 and GSTT1 Polymorphisms on Genetic Damage in Humans Populations Exposed to Radiation From Mobile Towers. (https://1.usa.gov/1hlQmoj)Gulati S, Yadav A, Kumar N, Kanupriya, Aggarwal NK, Kumar R, Gupta R., Arch Environ Contam Toxicol. 2015 Aug 5. [Epub ahead of print]

- In our study, 116 persons exposed to radiation from mobile towers and 106 control subjects were genotyped for polymorphisms in the GSTM1 and GSTT1 genes by multiplex polymerase chain reaction method. DNA damage in peripheral blood lymphocytes was determined using alkaline comet assay in terms of tail moment (TM) value and micronucleus assay in buccal cells (BMN). Our results indicated that TM value and BMN frequency were higher in an exposed population compared with a control group and the difference is significant. In our study, we found that different health symptoms, such as depression, memory status, insomnia, and hair loss, were significantly associated with exposure to EMR. Damaging effects of nonionizing radiation result from the generation of reactive oxygen species (ROS) and subsequent radical formation and from direct damage to cellular macromolecules including DNA.

Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations (https://www.ncbi.nlm.nih.gov/pubmed/16621850), Hutter HP et al, (May 2006), Occup Environ Med. 2006 May;63(5):307-13

- Found a significant relationship between some cognitive symptoms and measured power density in 365 subjects; highest for headaches. Perceptual speed increased, while accuracy decreased insignificantly with increasing exposure levels.

Oberfeld, A.E. Navarro, M. Portoles, C. Maestu, C. Gomez-Perretta, The microwave syndrome: further aspects of a Spanish study (http://www.powerwatch.org.uk/pdfs/20040809_kos.pdf),

- A health survey was carried out in La Ñora, Murcia, Spain, in the vicinity of two GSM 900/1800 MHz cellular phone base stations. The adjusted (sex, age, distance) logistic regression model showed statistically significant positive exposure-response associations between the E-field and the following variables: fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorder, depressive tendency, feeling of discomfort, difficulty in concentration, loss of memory, visual disorder, dizziness and cardiovascular problems.

Bortkiewicz et al, 2004 (Poland), Subjective symptoms reported by people living in the vicinity of cellular phone base stations: review, (https://www.ncbi.nlm.nih.gov/pubmed/15620045)Med Pr. (https://www.ncbi.nlm.nih.gov/pubmed/15620045#)2004;55(4):345-51. (https://www.ncbi.nlm.nih.gov/pubmed/15620045)

- Residents close to mobile phone masts reported: more incidences of circulatory problems, sleep disturbances, irritability, depression, blurred vision and concentration difficulties the nearer they lived to the mast.
- The performed studies showed the relationship between the incidence of individual symptoms, the level of exposure, and the distance between a residential area and a base station.

Wolf R and Wolf D, Increased Incidence of Cancer Near a Cell-phone Transmitter Station (http://www.powerwatch.org.uk/news/20050207_israel.pdf), International Journal of Cancer Prevention, (Israel) VOLUME 1, NUMBER 2, APRIL 2004

- A significant higher rate of cancer (300% increase) among all residents living within 300m radius of a mobile phone mast for between three and seven years was detected.
- 900% cancer increase among women alone
- In the area of exposure (area A) eight cases of different kinds of cancer were diagnosed in a period of only one year. This rate of cancers was compared both with the rate of 31 cases per 10,000 per year in the general population and the 2/1222 rate recorded in the nearby clinic (area B). The study indicates an association between increased incidence of cancer and living in proximity to a cell-phone transmitter station.

Changes of Neurochemically Important Transmitters under the Influence of modulated RF fields – A Long Term Study under Real Life Conditions (http://apps.fcc.gov/ecfs/document/view?id=7521095891)(Germany), Bucher and Eger, 2011

- German study showing elevated levels of stress hormones (adrenaline, noradrenaline), and lowered dopamine and PEA levels in urine in area residents during 1st 6 months of cell tower installation. Even after 1.5 years, the levels did not return to normal.

The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer (http://www.tetrawatch.net/papers/naila.pdf) (Umwelt-Medizin-Gesellschaft 17,4 2004) Eger et al, 2004 (Germany) (http://apps.who.int/peh-emf/research/database/emfstudies/viewstudy.cfm?ID=1226)

- 200% increase in the incidence of malignant tumors was found after five years' exposure in people living within 400m radius of a mobile phone mast. The proportion of newly developing cancer cases is significantly higher among patients who live within 400 meters of a cell phone transmitter. Early age of cancer diagnosis.

Microwave electromagnetic fields act by activating voltage-gated calcium channels: why the current international safety standards do not predict biological hazard. (https://bit.ly/1nQjboA) Martin L. Pall. Recent Res. Devel. Mol. Cell Biol. 7 (2014).

- "It can be seen from the above that 10 different well-documented microwave EMF effects can be easily explained as being a consequence of EMF VGCC activation: oxidative stress, elevated single and double strand breaks in

DNA, therapeutic responses to such EMFs, breakdown of the blood-brain barrier, cancer, melatonin loss, sleep dysfunction, male infertility and female infertility."

Pall ML. 2015. Microwave frequency electromagnetic fields (EMFs) produce widespread neuropsychiatric effects including depression. (http://electromagnetichealth.org/wp-content/uploads/2015/05/reveh-2015.pdf)J. Chem. Neuroanat. 2015 Aug 20.

- Non-thermal microwave/lower frequency electromagnetic fields (EMFs) act via voltage-gated calcium channel (VGCC) activation.
- Two U.S. government reports from the 1970s to 1980s provide evidence for many neuropsychiatric effects of non-thermal microwave EMFs, based on occupational exposure studies. 18 more recent epidemiological studies, provide substantial evidence that microwave EMFs from cell/mobile phone base stations, excessive cell/mobile phone usage and from wireless smart meters can each produce similar patterns of neuropsychiatric effects, with several of these studies showing clear dose–response relationships.
- Lesser evidence from 6 additional studies suggests that short wave, radio station, occupational and digital TV antenna exposures may produce similar neuropsychiatric effects. Among the more commonly reported changes are sleep disturbance/insomnia, headache, depression/depressive symptoms, fatigue/tiredness, dysesthesia, concentration/attention dysfunction, memory changes, dizziness, irritability, loss of appetite/body weight, restlessness/anxiety, nausea, skin burning/tingling/dermographism and EEG changes. In summary, then, the mechanism of action of microwave EMFs, the role of the VGCCs in the brain, the impact of non-thermal EMFs on the brain, extensive epidemiological studies performed over the past 50 years, and five criteria testing for causality, all collectively show that various non-thermal microwave EMF exposures produce diverse neuropsychiatric effects.

see illustration on next page

EMFs Affect Your Electric *Cells*

Each one of the trillions of cells in your body has microscopic channels in its membrane which allow calcium and other minerals to flow in and out of the cell. They are called "VGCCs", short for "Voltage-Gated Calcium Channels".

When a foreign EMF signal (such as a cell phone signal) hits the cell, it literally causes the doors of these calcium channels to stay stuck open — allowing excessive calcium to flow into the cell starting a few second after exposure.[16]

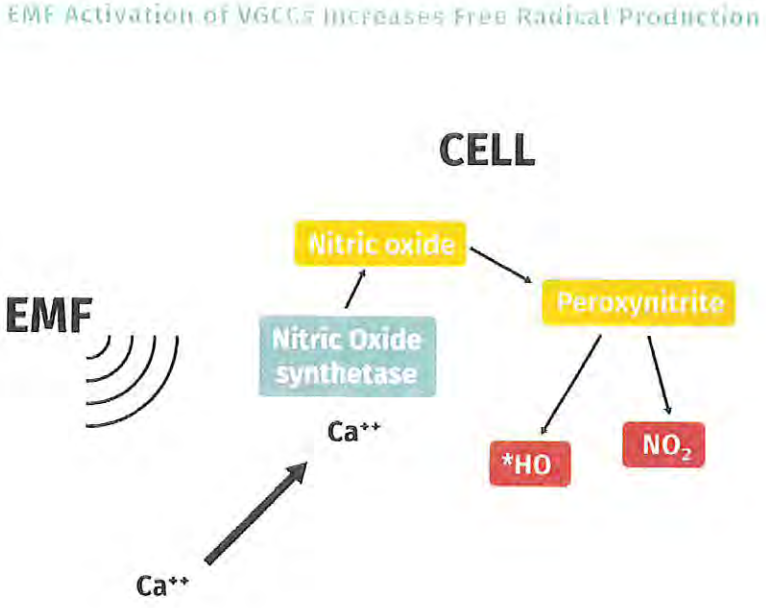

Image credit: Dr. Paul Dart and Dr. Martin Pall

Calcium is usually a healthy mineral for the human body. But in this particular situation, the cell receives an "overdose" of calcium — leading to a laundry list of consequences.

Excessive Calcium In Your Cells Leads To:

- Single strand breaks in cellular DNA
- Double strand breaks in cellular DNA
- Cancer
- Breakdown of blood-brain barrier
- Male and female infertility
- Depression and diverse neuropsychiatric symptoms
- Oxidative stress
- Melatonin depletion and sleep disruption
- Cataract formation
- Tachycardia, arrhythmia, sometimes leading to sudden cardiac death
- Hormonal disruption