Parents and Princeton University

Sent: Tue, Feb 11, 2014 9:59 am

-----Original Message-----
From: xxxxxxxxxxxxxxxx
To: cantrell <cantrell@princeton.edu>; bchance <bchance@princeton.edu>; shaundre <shaundre@princeton.edu>; tdrexel <tdrexel@princeton.edu>; "dupr?" <""dupr?""@princeton.edu>; selwood <selwood@princeton.edu>; hutzly <hutzly@princeton.edu>; rmizzo <rmizzo@princeton.edu>; marcians <marcians@princeton.edu>; jmcquaid <jmcquaid@princeton.edu>; kstates <kstates@princeton.edu>; jw6 <jw6@princeton.edu>
Cc: hpenrod <hpenrod@princeton.edu.>; trebyw <trebyw@princeton.edu>
Sent: Tue, Feb 11, 2014 9:59 am
Subject: Princeton WIFI "Safety" Statement is Inaccurate and Outdated.

Dear Princeton University Environment Health and Safety Staff,

I am writing as a parent deeply concerned about your official Princeton Statement on the safety of WIFI. This statement is outdated and contains clear inaccuracies requiring immediate attention:

- The site states, "Epidemiological studies by reputable scientists have consistently failed to demonstrate convincing evidence of any adverse health effects from RF exposure below the regulatory limits and guidelines cited below." This is simply not true. WIFI radiation frequencies are included in the World Health Organizations International Agency for the Research on Cancers classification. Please see the WHO 2011 monograph on Health effects from Radio frequency fields . http://www.saferemr.com/2013_04_01_archive.html
- Concerning exposure levels from WIFI , please note that even extremely low levels , well below exposure standards, are connected with serious health effects such as increased permeability of the blood brain barrier. . Please watch this video of Head of Neurosurgery Dr. Leif Salford- discussing extremely low power RF radiation as most efficiently opening the rat BBB. https://www.youtube.com/watch?v=E_WJ_aJPWIA
- **This Princeton Statement cites Australia** a few times- all from several years ago. You may be interested to know that Australia came out with **a fact sheet on how to minimize exposure to RF fields.**. http://www.arpansa.gov.au/radiationprotection/Factsheets/is_Wireless.cfm Australia also has just announced a multimillion dollar research program into the effects of RF and children. If this Statement is going to cite Australia then please be sure to put in it's government's fact sheet on how to reduce RF exposure.
-
- **Every reference cited on this page is outdated.** For example, the Statement cites the International Commission for Non-Ionizing Radiation Protection. Epidemiology of Health Effects of Radiofrequency Exposure. Please note that Mr Anders Ahlbom was kicked off the IARC after it was found he was also directing a telecom consultant group. http://microwavenews.com/Ahlbom.html
- **Facts about Standards in place**
- The EPA has stated the following in regards to the standards set 17 years ago. I am quoting the 2002 EPA letter to Janet Newton (attached) below.

1. Standards protect against short term injury only. " *They are believed to protect against injury that may be caused by acute exposures that result in tissue heating or electric shock and burn."*

2. Standards protect against thermal effects only. ***"*** *The FCC's exposure guideline is considered protective of effects arising from a thermal mechanism, but not from all possible mechanisms. Therefore the generalization by many that guidelines protect human beings from harm by any or all mechanisms is not justified."*

3. Standards protect whole body heating and not exposure to the brain and eyes. "I *n summary , the current exposure guidelines used by the FCC are based on the effects resulting from whole body heating, not exposure of and effect on critical organs including the brain and eyes.*

4. Standards did not consider non thermal *chronic* exposure such as in WIFI in schools. " *Federal health and safety agencies have not yet developed policies concerning possible risk from long term, non thermal exposures. ..Incorporating information on exposure scenarios involving repeated short term duration non thermal exposures that may continue over long periods of time (years) with an exposed population that includes children, the elderly, and people with various debilitating and medical conditions could be beneficial in delineating appropriate protective exposure guidelines."*

5. Standards do not protect children nor developing pregnancies. They simply were not set with these population's vulnerabilities in mind. Please note the in-utero studies often show effects in offspring and less effects in the mothers.

Compared with adults, research on children shows that microwave radiation is absorbed *twice* as much into their brain, up to *triple* in their brain's hippocampus and hypothalamus and up to *ten times* as much into the bone marrow of skull.- World Health Organization.

Research on WIFI radiation is showing health effects. I have attached some recent research that needs to be considered below. Indeed, this is a long email but the issue is complicated and requires a lengthy thoughtful response.

- **Dr Samet, Senior Scientist World Health Organization states that the IARC clasification means that "safety cannot be assured"** http://journals.lww.com/epidem/Fulltext/2014/01000/Commentary___Mobile_Phones_and_Cancer__Next_Steps.7.aspx
- **Multiple Scientists who served on the IARC Working Group have stated precautions need to be in place and that the research is enough to move the classification up to a higher level of risk.** Doctor Anthony Miller, World Health Organization EMF Group Scientist from the University of Toronto's Dalla Lana School of Public Health, testified in November 2013 that wireless exposure should be classified more stringently, as a 2A ("a probable carcinogen"), based on accumulating research since 2011. If anything- I urge you to watch this very short clip of his official testimony to the City of Toronto: http://www.youtube.com/watch?v=wARxnaxrRKk.
- **Dr. Hugh Taylor, Chief of Obstetrics at Yale Medical School,** did research showing that low levels of this radiation in utero made mice hyperactive, impaired their memory and changed their neuronal programming. The findings surprised him and he is now raising awareness about the possible adverse health effects. He stated:

"*As a research scientist and physician who studies how microwave radiation affects the outcomes of pregnancy, I am deeply concerned about growing exposures to cell phone and other wireless radiation*."

http://www.nature.com/srep/2012/120315/srep00312/full/srep00312.html

- "More research is needed to clarify the question of safety. " says the EPA. The Princeton Statement must reflect this state of the science. Safety is not assured.
-
- Frank Clegg, former Microsoft Canada President, just wrote a published an article in Vitality Magazine. I enjoyed his "Tech Exec 5 Step Guide". http://vitalitymagazine.com/article/invisible-threat/
- Dr Lennart Hardell who served on the IARC panel has stated that this radiation meets Hill criteria for a carcinogen. http://lennarthardellenglish.wordpress.com/2013/10/30/using-the-hill-viewpoints-from-1965-for-evaluating-strengths-of-evidence-of-the-risk-for-brain-tumors-associated-with-use-of-mobile-and-cordless-phones/

Princeton University has a reputation as a well respected institution. It is critical that such a prestigious University present updated and complete information to the public. At this time the sources are several years old and not reflective of the current state of science. In order for our young people to excel in the world after college they need to be in good health. Princeton could create a page for students on how to minimize exposure to prevent the serious possible risks posed by this radiation.

What if a pregnant staff member's desk is located directly near a wifi router? What of the possible impacts? It seems prudent to consider a precautionary approach in light of the in-utero research showing damage to the memory brain centers in mammals (See Dr. Suleyman Kaplan's FCC Submission attached).

For a full review of science by internationally respected Scientists- please see the Bio- Initiative Report http://www.bioinitiative.org/

From my research there are no safety assurances by expert professionals who have reviewed the research. Therefore Princeton cannot make any statement that it is "safe". It is of the upmost importance that Princeton take the time to address this issue to ensure the safety of students and staff. Our children are our future. Their safety should be the highest priority.

I look forward to hearing from you.

Sincerely, XXXXXX

Dr Scully's official testimony against WIFI in Toronto parks. (Past-President of Ontario Medical Association, Past-President of Canadian Medical Association, Past-President of Canadian Cardiovascular Society .")

> To the City Clerk:
>
> As a physician leader in Canada with a great commitment to the health of Canadians, I am very concerned about the increasing evidence internationally that EMR is creating increasing health problems in our population as its use increases exponentially. This is particularly true among children and young Canadians, and teacher [and nurses] who are continuously exposed to wifi routers in schools [and hospitals].
>
> As a cardiac specialist, I am concerned that approximately 20% of people have detrimental cardiac rhythm sensitivity to EMR.

This issue is under active consideration by the Health and Public Policy Committee of the Royal College of Physicians and Surgeons of Canada, the Health Policy and Public Health Committees of the Canadian Medical Association and the Council of Family Physicians of Canada, the Canadian Pediatric Society and the Canadian Cardiovascular Society.

There is an abundance of evidence from around the world that EMR can be harmful to health. Many countries...not Canada or the United States...have initiated policies to mitigate the risks. We, in Canada, need to do the same or more.

It is imperative that City of Toronto does *not* install wifi's in public parks and spaces. I ask you to vote against Councillor Matlow's proposal.

Sincerely,

Dr. Hugh Scully, BA,MD,MSc,FRSC[C],FACS

Professor of Surgery and Health Policy, University of Toronto,
Past-President, OMA, CMA, CCS,
Former Member of Council [Board], RCPSC and WMA,
Member, Health Policy Advisory Council, American College of Surgeons

The effects of long-term exposure to a 2450 MHz electromagnetic field on growth and pubertal development in female Wistar rats

Ozlem Sangun , Bumin Dundar , Hakan Darici , Selcuk Comlekci , Duygu Kumbul Doguc , Suheyla Celik

Electromagnetic Biology and Medicine : 1–9.
Posted online on 24 Jan 2014.

Abstract

The aim of this study was to investigate the effects of a 2450 MHz electromagnetic field (EMF) (wireless internet frequency) on the growth and development of female Wistar rats. The study was conducted on three groups of rats. The prenatal and postnatal groups were exposed to EMF 1 h/day beginning from intrauterine and postnatal periods, respectively. The third group was the sham-exposed group. Growth, nutrition and vaginal opening (VO) were regularly monitored. Serum and tissue specimens were collected at puberty. Histological examinations, total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) measurements in ovary and brain tissues and also immunohistochemical staining of the hypothalamus were performed besides the determination of serum FSH, LH, E2 and IGF-1 values. Birth masses of the groups were similar ($p > 0.05$). Mass gain per day was significantly lower and the puberty was significantly later in the prenatal group. Brain and ovary TOS and OSI values in the prenatal group were significantly increased ($p < 0.05$) compared to the control group. Serum LH levels of the prenatal and postnatal groups were increased, although serum FSH, and E2 values did not differ among the groups ($p > 0.05$). Histological examinations of the specimens revealed no statistically significant difference between the groups ($p > 0.05$). **Exposure to 2450 MHz EMF, particularly in the prenatal period, resulted in**

postnatal growth restriction and delayed puberty in female Wistar rats. Increased TOS and OSI values in the brain and ovary tissues can be interpreted as a sign of chronic stress induced by EMF. This is the first longitudinal study which investigates the effects of EMF induced by wireless internet on pubertal development beside growth.
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.871619

Summary | Full Text | PDF (525 KB) | PDF Plus (526 KB)

Effect of long-term exposure of 2.4 GHz radiofrequency radiation emitted from Wi-Fi equipment on testes functions
Suleyman Dasdag , Muzaffer Taş , Mehmet Zulkuf Akdag , Korkut Yegin
Electromagnetic Biology and Medicine : 1–6.
Posted online on 24 Jan 2014.

Abstract

The aim of this study was to investigate long-term effects of radiofrequency radiation (RFR) emitted from a Wireless Fidelity (Wi-Fi) system on testes. 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 RFR radiation for 24 h/d during 12 months (1 year). The same procedure was applied to the rats in the sham control group except the Wi-Fi system was turned off. Immediately after the last exposure, rats were sacrificed and reproductive organs were removed. Motility (%), concentration ($\times 10^6$ /mL), tail defects (%), head defects (%) and total morphologic defects (%) of sperms and weight of testes (g), left epididymis (g), prostate (g), seminal vesicles (g) were determined. Seminiferous tubules diameter (μm) and tunica albuginea thickness (μm) were also measured. However, the results were evaluated by using Johnsen's score. **Head defects increased in the exposure group ($p < 0.05$) while weight of the epididymis and seminal vesicles, seminiferous tubules diameter and tunica albuginea thickness were decreased in the exposure group ($p < 0.01$, $p < 0.001$, $p < 0.0001$).** However, other alterations of other parameters were not found significant ($p > 0.05$). **I n conclusion, we observed that long-term exposure of 2.4 GHz RF emitted from Wi-Fi (2420 μW/kg, 1 g average) affects some of the reproductive parameters of male rats. We suggest Wi-Fi users to avoid long-term exposure of RF emissions from Wi-Fi equipment.**
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.869752

Evaluation of selected biochemical parameters in the saliva of young males using mobile phones
Khalid M. Abu Khadra, Ahmad M. Khalil, Mahmoud Abu Samak, and Ahmad Aljaberi.Evaluation of selected biochemical parameters in the saliva of young males using mobile phones. Electromagnetic Biology and Medicine. Posted online on February 5, 2014. (doi:10.3109/15368378.2014.881370)

Abstract

The biochemical status in the saliva of 12 males before/after using mobile phone has been evaluated. Radio frequency signals of 1800 MHz (continuous wave transmission, 217 Hz modulate and Global System for Mobile Communications [GSM – non-DTX]) with 1.09 w/kg specific absorption rate (SAR) value were used

for 15 and 30 min. Cell phone radiation induced a significant increase of superoxide dismutase (SOD); there was a statistically significant effect of talking time on the levels of SOD, $F(2, 33) = 8.084$, $p < 0.05$, $\omega = 0.53$. The trend analysis suggests a significant quadratic trend, $F(1, 33) = 4.891$, $p < 0.05$; indicating that after 15 min of talking the levels of SOD increased, but as talking time increased the SOD activity started to drop. In contrast to this, there was no statistically significant effect of talking time on the level of salivary albumin, cytochrome c, catalase or uric acid. Results suggest that exposure to electromagnetic radiation may exert an oxidative stress on human cells as evidenced by the increase in the concentration of the superoxide radical anion released in the saliva of cell phone users.

http://informahealthcare.com/doi/abs/10.3109/15368378.2014.881370

Analysis of estimation of electromagnetic dosimetric values from non-ionizing radiofrequency fields in conventional road vehicle environments

Erik Aguirre , Peio Lopez Iturri , Leire Azpilicueta , Silvia de Miguel-Bilbao , Victoria Ramos , Uxue Gárate , Francisco Falcone

Electromagnetic Biology and Medicine : 1–10.
Posted online on 24 Jan 2014.

Abstract

A high number of wireless technologies can be found operating in vehicular environments with the aim of offering different services. The dosimetric evaluation of this kind of scenarios must be performed in order to assess their compatibility with current exposure limits. In this work, a dosimetric evaluation inside a conventional car is performed, with the aid of an in-house 3D Ray Launching computational code, which has been compared with measurement results of wireless sensor networks located inside the vehicle. These results can aid in an adequate assessment of human exposure to non-ionizing radiofrequency fields, taking into account the impact of the morphology and the topology of the vehicle for current as well as for future exposure limits.
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.863782

Summary | Full Text | PDF (719 KB) | PDF Plus (720 KB)

In vitro effect of cell phone radiation on motility, DNA fragmentation and clusterin gene expression of sperm

Zalata, A., A. Z. El-Samanoudy, D. Shaalan, Y. El-Baiomy, and T. Mostafa. In vitro effect of cell phone radiation on motility, DNA fragmentation and clusterin gene expression of sperm. Int J Fertil Steril, In Press. Published online ahead of print.

Background: Use of cellular phones that emits radiofrequency electromagnetic field (RF-EMF) has been increased exponentially and became a part of everyday life. This study aimed to investigate the effects of RF-EMF radiation emitted from cellular phones on sperm motility variables, sperm DNA fragmentation and clusterin (CLU) gene expression.

Materials and Methods: 124 semen samples were grouped into; normozoospermia (N, n=26), asthenozoospermia (A, n=32), asthenoteratozoospermia (AT, n=31) and oligoasthenoteratozoospermia (OAT, n=35). Semen samples were divided into two aliquots; samples not exposed to cell phone and samples exposed to cell phone radiation (850 MHz, maximum power < 1 watt; SAR 1.46 W/kg at 10 cm distance) for 1 hr. Before and immediately after exposure both aliquots were subjected to assessment of sperm motility, acrosin activity, sperm DNA fragmentation and CLU gene expression. Statistical differences were analyzed using paired t-student test for comparisons where P< 0.05 was set as significant.

Results: T here was significant decrease in sperm motility, sperm linear velocity, sperm linearity index, sperm acrosin activity and significant increase in sperm DNA fragmentation percent, CLU gene expression and CLU protein levels in the exposed semen samples to RF-EMF compared with non- exposed samples in OAT > AT > A > N groups (P<0.05).

Conclusions: Cell phone emissions have a negative impact on exposed sperm motility indices, sperm acrosin activity, sperm DNA fragmentation and CLU gene expression especially in OAT cases.

Dama MS, Bhat MN. (2013) Mobile phones affect multiple sperm quality traits: a meta-analysis [v1; ref status: indexed, http://f1000r.es/ny] *F1000Research* 2013, **2** :40 (doi: 10.12688/f1000research.2-40.v1).

Abstract

As mobile phone usage is growing rapidly, there is a need for a comprehensive analysis of the literature to inform scientific debates about the adverse effects of mobile phone radiation on sperm quality traits. Therefore, we conducted a meta-analysis of the eligible published research studies on human males of reproductive age. Eleven studies were eligible for this analysis. Based on the meta-analysis, mobile phone use was significantly associated with deterioration in semen quality (Hedges's g = -0.547; 95% CI: -0.713, -0.382; p < 0.001). The traits particularly affected adversely were sperm concentration, sperm morphology, sperm motility, proportion of non-progressive motile sperm (%), proportion of slow progressive motile sperm (%), and sperm viability. Direct exposure of spermatozoa to mobile phone radiation with *in vitro* study designs also significantly deteriorated the sperm quality (Hedges's g = -2.233; 95% CI: -2.758, -1.708; *p* < 0.001), by reducing straight line velocity, fast progressive motility, Hypo-osmotic swelling (HOS) test score, major axis (μm), minor axis (μm), total sperm motility, perimeter (μm), area (μm ^{2}), average path velocity, curvilinear velocity, motile spermatozoa, and acrosome reacted spermatozoa (%). The strength of evidence for the different outcomes varied from very low to very high. The analysis shows that mobile phone use is possibly associated with a number of deleterious effects on the spermatozoa.
http://www.ncbi.nlm.nih.gov/pubmed/24358850 .

Comparative experiments on phantom and *ex vivo* liver tissue in microwave ablation

Fei Zhai , Qun Nan , Jinli Ding , Dehao Xu , Huijuan Zhang , Youjun Liu , Fan Bai

Electromagnetic Biology and Medicine : 1–8.
Posted online on 24 Jan 2014.

Abstract

Purpose : The aim of this study is to investigate the thermal field distribution of phantom and *ex vivo* liver tissue in microwave ablation. We intent to verify if the phantom can be used in future studies *in lieu* of actual

tissue. *Methods* : This experiment was divided into two groups of phantom and *ex vivo* porcine liver tissue. 2450 MHz is set. The tests last up to 240 s in 60 W. The velocity of the circulating water pumps were adjusted to 40 rounds/min. Twenty-five copper-constantan thermocouples (TCs) were inserted at the specified position to record temperature data. *Result* : For the cooling water, the temperature field was non-symmetric distribution at the gap before ($z > z < 0$ mm) of two groups of experiments. At the part without cooling water ($z > 0$ mm), effective ablation areas were larger; near the microwave antenna, the temperature curves showed good consistency for both materials. Far away from the microwave antenna, the value difference increased between phantom and liver tissue. Moreover, the effect of cooling water in phantom is more obvious than it in liver tissue. The shapes of ablation areas from two groups are not same. *Conclusion* : The result of the present work implied that heating patterns of liver tissue and phantom are comparable. But the difference of temperature field between two kinds of materials cannot be ignored. In cases of using phantom to verify temperature field *in lieu* of actual tissue, the researchers should pay full attention to these difference points.
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.868813

Summary | Full Text | PDF (528 KB) | PDF Plus (529 KB)

Effects of rotating magnetic field exposure on the functional parameters of different species of bacteria
Karol Fijałkowski , Paweł Nawrotek , Magdalena Struk , Marian Kordas , Rafał Rakoczy
Electromagnetic Biology and Medicine : 1–8.
Posted online on 24 Jan 2014.

Abstract

The aim of the present study was to determine the effect of the rotating magnetic field (RMF) on the growth, cell metabolic activity and biofilm formation by *S. aureus, E. coli, A. baumannii, P. aeruginosa, S. marcescens, S. mutans, C. sakazakii, K. oxytoca* and *S. xylosus* . Bacteria were exposed to the RMF (RMF magnetic induction $B = 25–34$ mT, RMF frequency $f = 5–50$ Hz, time of exposure $t = 60$ min, temperature of incubation 37 °C). The persistence of the effect of exposure ($B = 34$ mT, $f = 50$ Hz, $t = 60$ min) on bacteria after further incubation ($t = 300$ min) was also studied. The work showed that exposure to RMF stimulated the investigated parameters of *S. aureus, E. coli, S. marcescens, S. mutans, C. sakazakii, K. oxytoca* and *S. xylosus* , however inhibited cell metabolic activity and biofilm formation by *A. baumannii* and *P. aeruginosa* . The results obtained in this study proved, that the RMF, depending on its magnetic induction and frequency can modulate functional parameters of different species of bacteria.
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.869754

Summary | Full Text | PDF (456 KB) | PDF Plus (457 KB)

Epinephrine, DNA integrity and oxidative stress in workers exposed to extremely low-frequency electromagnetic fields (ELF-EMFs) at 132 kV substations
Ravindra Tiwari , N. K. Lakshmi , S. C. Bhargava , Y. R. Ahuja
Electromagnetic Biology and Medicine : 1–7.
Posted online on 24 Jan 2014.

Abstract

There is apprehension about widespread use of electrical and electromagnetic gadgets which are supposed to emit electromagnetic radiations. Reports are controversy. These electromagnetic fields (EMFs) have considerable effect on endocrine system of exposed subjects. This study was focused to assess the possible bioeffects of extremely low-frequency (ELF)-EMFs on epinephrine level, DNA damage and oxidative stress in subjects occupationally exposed to 132 kV high-voltage substations. The blood sample of 142 exposed subjects and 151 non-exposed individuals was analyzed. Plasma epinephrine was measured by enzyme-linked immunosorbent assay, DNA damage was studied by alkaline comet assay along with oxidative stress. Epinephrine levels of sub-groups showed mean concentration of 75.22 ± 1.46, 64.43 ± 8.26 and 48.47 ± 4.97 for high, medium and low exposed groups, respectively. DNA damage ranged between 1.69 μm and 9.91 μm. The oxidative stress levels showed significant increase. T he individuals employed in the live-line procedures were fo und to be vulnerable for EM stress with altered epinephrine concentrations, DNA damage and increased oxidative stress.
Read More: http://informahealthcare.com/doi/abs/10.3109/15368378.2013.869755

Plasma thyroid hormones and corticosterone levels in blood of chicken embryos and post hatch chickens exposed during incubation to 1800 MHz electromagnetic field

Pawlak K, Sechman A, Nieckarz Z. Plasma thyroid hormones and corticosterone levels in blood of chicken embryos and post hatch chickens exposed during incubation to 1800 MHz electromagnetic field. Int J Occup Med Environ Health. 2014 Jan 31. [Epub ahead of print]

Abstract

INTRODUCTION: This study attempted to determine the effect of a 1800 MHz electromagnetic field (EMF) (only carrier frequency) on thyroxine (T4), triiodothyronine (T3) and corticosterone (CORT) concentrations in the blood plasma of chick embryos, and to investigate the effect of electromagnetic field (EMF) exposure during embryogenesis on the level of these hormones in birds that are ready for slaughter.

MATERIAL AND METHODS: Throughout the incubation period, embryos from the experimental group were exposed to a 1800 MHz EMF with power density of 0.1 W/m2, 10 times during 24 h for 4 min. Blood samples were collected to determine T4, T3 and CORT concentrations on the 12th (E12) and 18th (E18) day of incubation, from newly hatched chicks (D1) and from birds ready for slaughter (D42).

RESULTS: The experiment showed that T4 and T3 concentrations decreased markedly and CORT levels increased in the embryos and in the newly hatched chicks exposed to EMF during embryogenesis. However, no changes were found in the level of the analyzed hormones in the birds ready for slaughter. Differences in T4 and T3 plasma concentrations between the EMF-exposed group and the embryos incubated without additional EMF were the highest in the newly hatched chicks, which may be indicative of the cumulative effect of electromagnetic field on the hypothalamo-pituitary-thyroid axis (HPT).

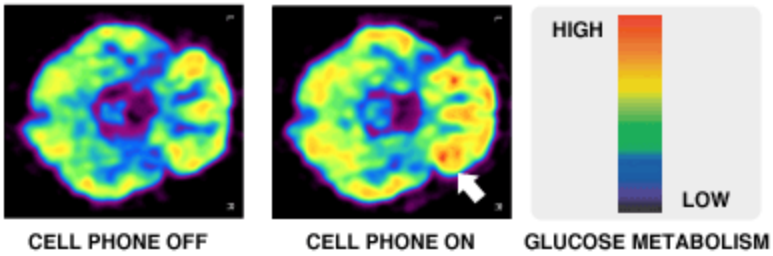
DISCUSSION: The obtained results suggest that additional 1800 MHz radio frequency electromagnetic field inhibits function of HPT axis, however, it stimulates hypothalamo-pituitary-adrenal axis by inducing adrenal

steroidogenic cells to synthesize corticosterone. Further investigations are needed to elucidate the mechanisms by which radio EMFs affect HPT and HPA axis function in the chicken embryos.

The Environmental Working Group also does some nice summaries of research.
http://www.ewg.org/cell-phone-radiation-affects-brain-function

EWG's Guide to Safer Cell Phone Use: Cell phone radiation alters brain activity

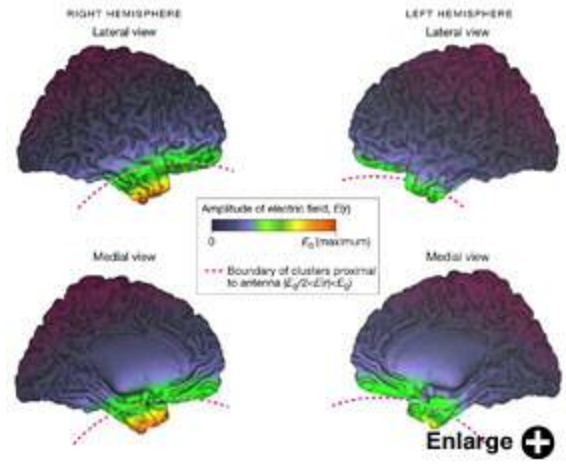
August 27, 2013



Brain activity accelerates near cell phone antenna
Volunteer's brain scans, normal (LEFT) and after 50 minutes with an active cell phone on right ear, (RIGHT) show increased metabolic activity near phone's antenna. (ARROW) A team led by Dr. Nora Volkow, head of the National Institute on Drug Abuse, used advanced imaging technology to monitor glucose consumed in the brain. Conclusion: weak cell phone emissions visibly changed brain activity. More studies are needed to determine health implications. Image source: JAMA
Washington, D.C. – A team led by Dr. Nora D. Volkow, a pioneering brain imaging scientist who heads the National Institute on Drug Abuse,has reported that cell phone radiofrequency radiation alters brain activity in human subjects.
The study, published by the prestigious Journal of the American Medical Association, is the first investigation to document changes in brain glucose metabolism after cell phone use. In a video accompanying the report, Volkow said the team focused on how the brain consumes glucose because "It's a very sensitive marker to indicate if there are changes in brain activity that may be driven by a given stimulus, which in this case was the cell phone."
The conclusion, according to Volkow: "Even though the radio frequencies that are emitted from current cell phone technologies are very weak they are able to activate the human brain to have an effect."
"This research offers an important insight into potential effects of cell phone radiation on the human brain," Renee Sharp, director of the Environmental Working Group California office said. "It joins the growing list of studies that have raised concerns about cell phone use and the brain."
Cell phone radiation can change brain activity
Video produced by the Journal of the American Medical Association features Dr. Nora Volkow, a pioneer in the field of brain imaging, explaining how she and a team from the National Institutes of Health and Brookhaven National Laboratory investigated the impact of cell phone radiofrequency emissions on the brain. "We really know relatively little about the potential effects that cell phone technologies may have on how the brain works," Volkow says. To find out, researchers fixed cell phones to 47 volunteers' heads, then made PET scans of metabolic shifts in their brains. See the experiment here. Video source: JAMA
The study's authors, who are affiliated with the National Institute on Drug Abuse, the National Institute on Alcohol Abuse and Alcoholism and Brookhaven National Laboratory, wrote that "these results provide

evidence that the human brain is sensitive to the effects of RF-EMF [radiofrequency-modulated electromagnetic fields] from acute cell phone exposures." Volkow is recognized for using imaging to explore changes in the brain linked to addictive drugs, obesity, attention-deficit disorder and aging.

The research team explored the impact of cell radiation on the brain by placing cell phones on both ears of 47 healthy volunteers. The volunteers, seated in a darkened room, were directed to keep their eyes closed and remain still for 50 minutes. On the first day, both phones were turned off. On the second day, one was turned on.



The volunteers' brains were subjected to positron emission tomography, commonly known as PET scans, a medical imaging technology, to measure glucose metabolism. "Compared with no exposure, 50-minute cell phone exposure was associated with increased brain glucose metabolism in the region closest to the antenna," the study said.

The exact mechanism underlying these metabolic effects and their human health significance are still under investigation. Volkow and her colleagues theorized that the changes they observed could be due to "cell membrane permeability, calcium efflux, cell excitability, and/or neurotransmitter release." Significantly, they rejected the hypothesis that the changes were caused by tissue heating. This finding places them at odds with the cell phone industry, which acknowledges no effects but heating when the brain absorbs cell phone radiation.

While scientists continue investigating the question, EWG recommends cell phone users limit their exposure to cell phone radiation by taking easy steps such as getting a headset, using speaker-phone mode, keeping the phone away from their body, and looking for low-radiation phone models. Click for more tips http://www.ewg.org/cellphoneradiation/8-Safety-Tips

Link to full study: http://jama.ama-assn.org/content/305/8/808.short Volkow ND, Tomasi D, Wang GJ, Vaska P, Fowler JS, Telang F, Alexoff D, Logan J, Wong C. 2011. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. Journal of the American Medical Association 305 (8), in press.

Listen to a press interview with brain imaging pioneer Dr. Nora Volkow.