Radiofrequency Risks

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Overview of RF Risks

Known biological effects:

- Lowers immune status (-IL10,+IL6,-NK)
- Disrupts instrinsic rhythms (EEG, HRV)
- Blocks/opens BBB
- Decreases pineal function (-melatonin)
- Increases mold growth and mycotoxins
- Affects fertility
- Generates oxidative species and inflammatory pathway activation in brain tissue.

Selected papers

BioChem J. 2007 April 25, Freidman, Kraus, et. al.

Mechanism of short-term ERK activation by electromagnetic fields at mobile phone frequency.

- Exposure to non-thermal microwave fields by mobile phones affects expression of many proteins.
- Act via ERK (extracellular-signal-regulated kinase) MAPK (mitogen-activated protein kinase) cascades, a central signally pathway.
- Delination of mechanism: plasma membrane activation of NADH oxidase, generating ROS, which stimulate MMP, and release of HB-EGF, which further activates ERK cascade.

Selected papers

Electromagnetic Biology and Medicine January 2012, Fragopoulou, et. al.

Brain proteome response following whole body exposure of mice to mobile phone or wireless DECT base radiation.

- Investigated effects of fields on proteome of cerebellum, hippocampus, and front lobe of mice following long-term whole body irridation.
- Exposure of typical mobile phone or DECT (cordless phone) vs. control animals.
- Results show alteration of 143 brain proteins including those that have been linked to Alzheimer's, brain cancer, glioblastoma, and glucose metabolism.
- Studies protein expressions are related to alterations in brain plasticity, oxidative stress, and programmed cell death.
- Possible explanation for reported health hazards of headaches, sleep disturbances, fatique, memory deficits and brain tumor induction.

Selected papers

J of Clinical Oncology 2009 November 20, Myung et. al.

Mobile Phone Use and Risk of Tumors: a Meta-Analysis

- Meta-analysis of case controlled studies on association between mobile phone use and tumor risk.
- Reviewed 465 articles, involving 37,916 participants.
- Key finding was evidence of possible link between mobile phone use and increased tumor risk, with clearer evidence at studies looking at a 10 year or greater mark.

Selected papers

Surgical Neurology 2008 December 23, Khurana et. al.

Cell Phone and brain tumors: a review including the long-term epidemioliogic data.

- Reviewed all 11 long-term studies in the field that were in peer-reviewed journals, studied 10 years plus users and included “laterality” analysis.
- Conclusion: “there is adequate epidemiologic evidence to suggest a link between prolonged cell useage and devleopment of an ipsilateral brain tumor.”
- Data showed statistical significance for glioma and acoustic neuroma but not for meningioma.

Selected papers

JAMA 2011 February 23, Volkow et. al.

Effects of Cell Phone Radiofrequency Signal Exposure on Brain Glucose Metabolism.

- RCT, cross-over design of 47 healthy participants using PET with fluoresence.
- 50 minute phone call was associated with increased brain glucose metabolism in the area closest to the antenna.
- Proposed mechanisms include changes in cell membrane permeability calcium efflux, cell excitabiltiy and/or neurotransmitter release.

One outcome of the glucose study

Dr. Ronald Herberman, Director, University of Pittsburgh Cancer Institute, made worldwide headlines recently for sending out a memo to his staff, warning that cell phones might cause brain tumors.

"Recently I have become aware of the growing body of literature linking long-term cell phone use to possible adverse health effects including cancer," the memo from Dr. Ronald Herberman reads. "Although the evidence is still controversial, **I am convinced that there are sufficient data to warrant issuing an advisory to share some precautionary advice on cell phone use**."

"This stunning report indicates that even short-term exposure to nerve cells from cell phones can increase glucose in the brain," said Dr. Herberman. "**We know that increased glucose also occurs with infections and other inflammatory processes, and leads to the production of potentially damaging reactive oxygen radicals that can alter the ways that cells and genes work."**

For the tips he offered his staff go to:

http://blog.cellphone-health.com/2011/11/10-cell-phone-radiation-protection-tips.html/

Selected papers

J of Neuro and Neurophysiol, Hallberg and Morgan 2011 December 20

The Potential Impact of Mobile Phone Use on Trends in Brain and CNS Tumors.

- Modeling for prediction of future brain cancer rates based on current epidemiological risks and coincident unrelated environmental changes that inhibit DNA repair.
- Methodogy used was modeled on work to predict trends in skin melanoma and mortality from AD.
- Key findings are a range of predictive increased rates of brain cancer between 2 and 25 times over the next 30 years.

Selected papers

Toxicology Letters 2009 August 25, Soderqvist et. al.

Exposure to an 890-MHz mobile phone-like signal and serum levels of S1008 and transthyretin in volunteers.

- Study looked at 30 minute exposure at the temporal area of the head.
- Blood sampling found no difference in S100B but a statistically significant increase in transthyretin at 60 minutes after the study time.
- Key finding is evidence of peripheral biomarker of blood-brain barrier integrity.

Selected papers

International Agency for Research on Cancer, World Health Organization, May 31, 2011

- **Meeting from May 24 thru May 31, a group of 31 scientists from 14 countries to assess the potential carcinogenic hazards from exposure to RF**
- **Conclusion statement: "the evidence, while still accumulating, is strong enough to support a conclusion and the 2B classification...means there is some risk, and therefore we need to keep a close watch for a link between cell phones and cancer risk."**
- **Category 2B includes: lead, engine exhaust and chloroform.**
- **Concise report on main conclusions: The Lancet Oncology, vol. 12, July 2011.**

Selected papers

Epidemiology 2008 July, Hozefa et. al.

Prenatal and Postnatal Exposure to Cell Phone Use and Behavioral Problems in Children

- Ongoing study sponsored by UCLA School of Public Health and University of Aarhus in Denmark.
- Study looked at 13,159 Danish children born between 1997 and 1998.
- By questionnaire of mothers found that children who were exposed to cell phones in the womb and in early childhood had higher prevalence of emotional symptoms, behavioral problems, inattention, hyperactivity and problems with peers – with a difference of an 80% increase in some studied markers.

Selected papers

Pathol Biol 2002, Santini, et. al.

Study of the health of people living in the vicinity of mobile phone base stations: Influences of distance and sex.

By questionnaire 530 people were surveyed about a range of symptoms: irritability, depression, loss of memory, dizziness, libido decrease, tiredness, headache, sleep disruption, naseau, lack of appetite, difficulties with movement, and visual disturbances

- Groups were studied by location of homes in proximity to a cell phone base station (tower/antenna): up to a distance of 300 meters (3 football field lengths).
- Some symptoms diminshed at 10 meters (32 feet) including: nausea, loss of appetite, visual disturbances and difficulties with movement.
- For other symptoms, including headaches, fatigue, sleep disturbances there is there is not this drop off in reports with distance up to 300 meters.

Possible mechanisms: http://emfwise.com/science.php#mechanism

- **Possible Mechanisms** **Possible Consequences**
- **Free Radical** Increased free radical activity can result to damage not only to DNA but also to proteins (See Lai/Singh and 23 other papers since 1997) DNA damage, genotoxic effects, neurotransmitter dopamine damage, enzyme effects
- **Calcium Efflux** Impacts on neurological and cardiological system, membrane leakage allowing in unwanted substances, Interferes with cellular communication systems, Reduces melatonin
- **Magnetite and Cryptochrome** Impacts navigation of animals
- **Electrical** Electrical activity is involved in the heart and brain (EEG effects in alpha band); A study published in 2011 in the journal Nature Neuroscience reported that neurons can communicate at a distance with electric fields. Microwaves can also trigger heart arrhythmia, e.g. in frogs.
- **Electron Interaction** Stress response in the form of stress proteins, DNA damage (Martin Blank)
- Resonance As with microwave cooking, hydrogen-oxygen bonds can resonate. These bonds are also in hydrogen-bond bridges in maintenance of protein 3D structure.
- Dielectric and Attractive forces Mathematical modeling from Bo Sernelius predicts that radiation would affect attractive forces between cells, resulting in clumping. Magda Havas and German students have found that blood clumping can result from microwave exposures such as cordless and cell phone use. Additionally, electromagnetic radiation may affect the properties of water.
- Heating Effects At high enough levels of microwaves, heating may result in tissue destruction, cataract formation, inhibition of cell growth through depression of enzyme activity, increased membrane permeability (See Kane, 20). Microwave hearing may also result from thermoelastic expansion resulting in acoustic pressure. See references.
- From: http://emfwise.com/science.php#mechanism

Overview of the science: http://emfwise.com/science.php#mechanism

Genetic

- DNA breaks: Shown by ~11 studies in total including
- * Lai/Singh at the U. of Washington
- * The 7-nation REFLEX project, and
- * The U. of Vienna.
- Increased microwave-induced free radical activity found by Lai/Singh and 23 other papers may be partly responsible.
- Effects on gene expression
- Increased cancer incidence around
- * Radio/TV towers (Michelozzi 2002, Cherry 2000, Dolk 1997, Hocking 1996),
- * Mobile phone base stations (Eger 2004, Wolf and Wolf 2004)
- * Electricity towers (Ahlbom et al, 2000, Greenland et al, 2000, Michael Kundi)
- * Dirty electricity (Milham and Morgan)
- Infertility in insects and humans (possibly as a result of DNA breaks and apoptosis involving the gametes)
- Development problems in the young

Overview of the science:http://emfwise.com/science.php#mechanism

Neurological

- **(1) Impacts EEG**
- **(2) Changes to neurotransmitter levels**
- **(3) The blood-brain barrier is opened, allowing toxins to cross into the brain (Allan Frey, Leif Salford, Oscar and Hawkins, and Albert and Kerns)**
- **(4) Neuronal death (Leif Salford) and memory loss in rats (Henry Lai, Lukas H. Margaritis)**
- **(5) Calcium efflux in brain tissue (C.F. Blackman, Ross Adey)**
- **(6) Demyelination of rat neurons (J.C. Lin)**
- **(7) Increase of brain glucose metabolism after 50 minutes of cell phone exposure (Volkow et al, 2011)**
- **(8) Stress proteins (Martin Blank)**

Overview of the science:http://emfwise.com/science.php#mechanism

Cardiological

- **— A double-blind study showed that EHS individuals experience Tachycardia from DECT cordless phones (Magda Havas)**
- **— Blood cells clump in rouleaux formation, as predicted by mathematical modelling (Bo Sernelius)**
- **— Arrhythmia, as shown in double-blind study by Magda Havas**
- **— High Blood Pressure, as shown in a double-blind study**

Immunological

- **—Increased production of histamines and mast cell count, involved in allergic reactions, has been observed.**
- **— Morphologically altered immune cells**
- **— Studies on increased allergies found in mobile phone users**
- **— Studies on Electrohypersensitivity (Olle Johansson)**

Endocrine

- **—Decrease in ACTH, cortisol, thyroid hormones, after long-term exposure (Emad F. Eskander et al, 2011)**
- **— Decrease in serotonin and nightly melatonin, but increase in daytime melatonin from telecom mast (Kempten West)**
- **— Increase in "depressive mood disturbances, lethargy and listlessness, appetite disturbances, inner agitation" near telecom mast (Kempten West)**

Animals

- **— Affects animal navigation (birds, bees, etc.), — Landau University study in Germany on DECT cordless stations and bee colony collapse**

Selected papers

Electromagnetic Biology and Medicine 2002, Santini et. al.

Symptoms Experienced by Users of Digital Cellular Phones: A Study of a French Engineering School.

- Questionnaire of 161 engineering students and employees.
- Found signifcant increased concentration difficulties.
- Increased reports of discomfort, warmth, pricking of the ear during phone conversations as the duration and number of calls per day increased.

Selected papers

Fertil Steril. January 2008, Agarwal et. al.

- Comparison of mean sperm count, motility and morphology among four cell phone user groups; subjects (361) were men undergoing infertility evaluation.
- Usage by group ranged from none to over 4 hours a day (with break at 2 and 2-4 hours).
- Result was decrease in sperm parameters with increase in daily exposure, and was independent of initial semen quality.

Selected quotes

Dr. David Carpenter,Dean of the School of Public Health, State University of New York:

“up to 30% of all childhood cancers come from exposure to EMFs.”

Martin Halper, EPA Chief of Analysis and Support:

“I have never seen a set of epidemioloigcal studies that remotely approached the weight of evidence that we're seeing with EMFs. Clearly there is something here.”

Magda Havas, PhD, Trent University Canada:

“Radiofreqency radiation..are harmful at ordes of magnitude well below existing guidelines...there is an emerging health crisis at hand and time is of the essence.”

Selected quotes

Olle Johansson, PhD, Karolinska Institute, Sweden:

"I strongly advise all governments to take the issue of electromagnetic health hazards seriously and to take action while there is still time...too great a risk that the ever increasing RF-based communications technologies represent a real danger to humans, especially because of their exponential, ongoing, and unchecked growth...standard (should be) biologically-based, communicating the results of the independent science on this topic and aggessively researching links with a multitude of associated medical condition." For more from Dr. Johansson go to:

http://www.youtube.com/watch?v=GqW5JCTPYS8&feature=related

Board of the American Academy of Environmental Medicine, 2009:

"it is important that the scientific community, governments, health care professionals and the public use caution with respect to the use of wireless and microwave technology as it has not been proven safe."

American Academy of Environmental Medicine

Issued press release on “smart” meters (RF) on April 12, 2012. For this document and the supporting position paper go to:

http://www.aaemonline.org/positionpapers.html

“More independent research is needed to assess the safety of “Smart Meter” technology...patients are reporting to physicians the development of symptoms and adverse health effects after “Smart Meters” are installed in their homes. Immediate action is necessary to protect the public's health.”

From the supporting document to the press release:

“Multiple studies correlate RF exposure with diseases such as cancer, neurological disease, reproductive disorders, immune dysfunction, and *electromagnetic hypersensitivity*.”

Resources

Disconnect, a book about the cell phone industry and health effects of exposure:

http://www.disconnectbook.com/

References from the AAEM on the science:http://aaemonline.org/images/referencelistemf.pdf

You Tube (series on the basic science and clinical research):http://www.youtube.com/user/magdahavas

Cell phone health resources (partial answers and some interesting visuals):

http://www.cellphone-health.com/

Organizations working on the issues

The EMR Policy Institute: http://www.emrpolicy.org/

Electromagnetic Health (sign petition to Congress):
http://electromagnetichealth.org/

EMF Safety Network :http://emfsafetynetwork.org/

Center for Safer Wireless: http://centerforsaferwireless.org/

Institute for Bau-Biologie and Ecology: http://hbelc.org/about/currentevents.htm

(IBE Annual conference, Washington, DC, October 11-16, 2012.)

American Academy of Environmental Medicine:

http://www.aaemonline.org/annualmeeting.html

(AAEM annual conference, St. Petersburg, Fl, October 3-7, 2012)

Final comments

“Facts don't cease to exist just because they are ignored.” Aldous Huxley.

“Never doubt that a small group of thoughtful, committed people can change the world. Indeed it is the only thing that ever has.” Margaret Mead.

“Our lives begin to end the day we become silent about things that matter.” Martin Luther King, Jr.

“...i think it's time we stop, children, what's that sound ? everyone looks what's going down...” Buffalo Springfield. For the full song go to:

http://www.youtube.com/watch?v=f5M_Ttstbgs