

Electromagnetic Fields: Modern Health Hazard?

April 6, 2016

Oram Miller, BBEC, EMRS

Certified Building Biology Environmental Consultant,
Electromagnetic Radiation Specialist

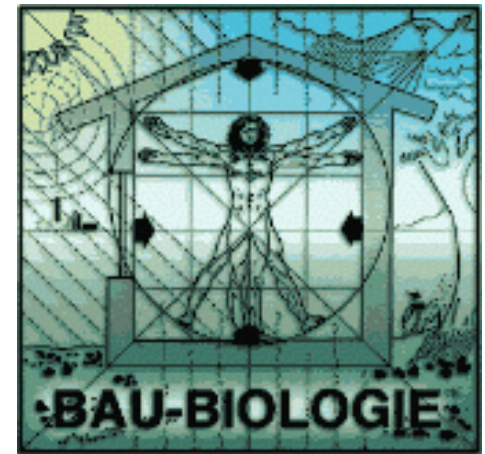
West Los Angeles, California

310-720-7686

www.createhealthyhomes.com

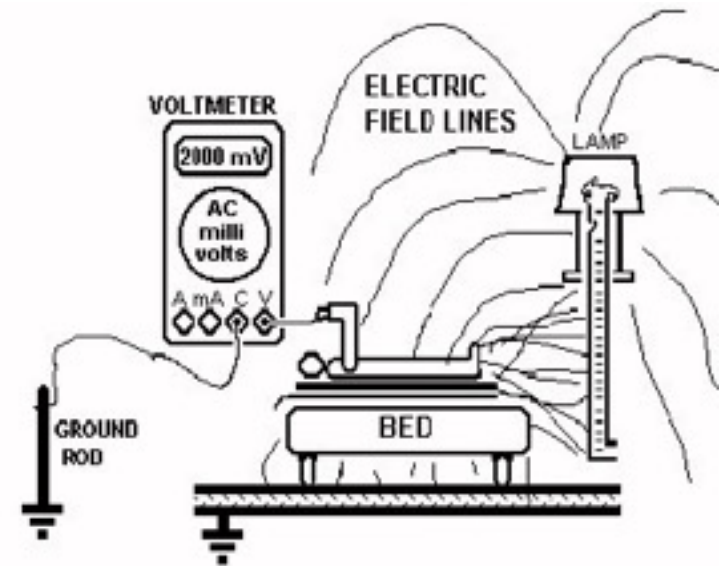
Source of this Knowledge: Building Biology® Profession

- ▶ The relationship between homes and human health
- ▶ Founded in Germany in the 1970s
- ▶ Brought to North America 25 years ago by architect, Helmut Ziehe
- ▶ Founded International Institute for Building Biology® and Ecology (IBE), Clearwater, Florida www.hbelc.org
- ▶ Over 120 Certified Building Biology® Environmental Consultants (BBECs) in USA and Canada



Goals of Building Biology®

- ▶ Find and reduce sources of toxicity in the home or office – IAQ, EMFs, Outgassing Building Materials
- ▶ Strengthen your tolerance to toxic influences outside the home
- ▶ By reducing exposure to household toxins and creating an EMF-free sleeping, living and work environment



Courtesy Spark Burmaster, EE, BBEC

Building-Related Causes of Ill Health

Two groups of clients for Building Biologist:

- ▶ 60-70 % of clients are electrically hypersensitive (EHS)
- ▶ Two thirds of these clients are also symptomatic
- ▶ 30-40% of overall clients are not sensitive or symptomatic, just health conscious
- ▶ You always have an interaction between sources of EMF toxicity and diet, heredity, stress levels, healing modalities

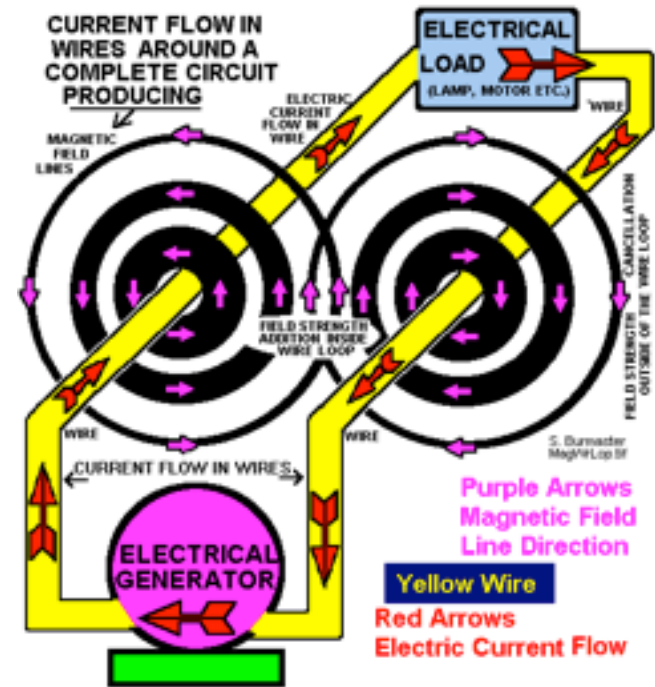
Building-Related Causes of Ill Health

Among the General Public:

- ▶ Only 3-5% are electrically hypersensitive (EHS)
- ▶ Yet, up to one third are estimated to be symptomatic from chronic use of wireless devices used at close proximity
- ▶ *Everyone* has cellular damage from RF exposure
- ▶ Thus, two-thirds of population can repair the cellular damage at night and do not become symptomatic (a number that is expected to decrease)
- ▶ Your risk ratio for disease is one out of the three chances

Four types of “EMFs”

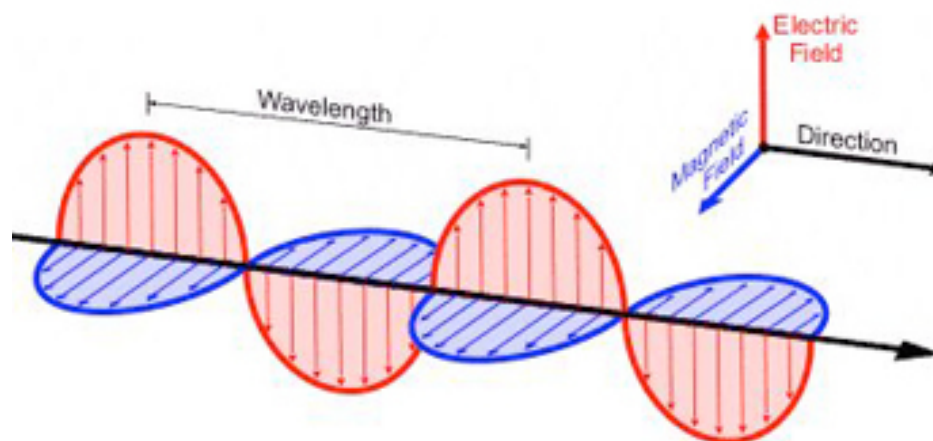
- ▶ AC Electric Fields from house wiring and power lines (at 60 Hz)
- ▶ AC Magnetic Fields from house wiring and power lines (at 60 Hz)
- ▶ Radio Frequency (RF) Fields (800, 900, 2,400 MHz)
- ▶ “Dirty Electricity” from harmonic frequencies (2,000 — 100,000 Hz)



Courtesy Spark Burmaster, EE, BBEC

Electric & Magnetic Field (EMF) Exposure

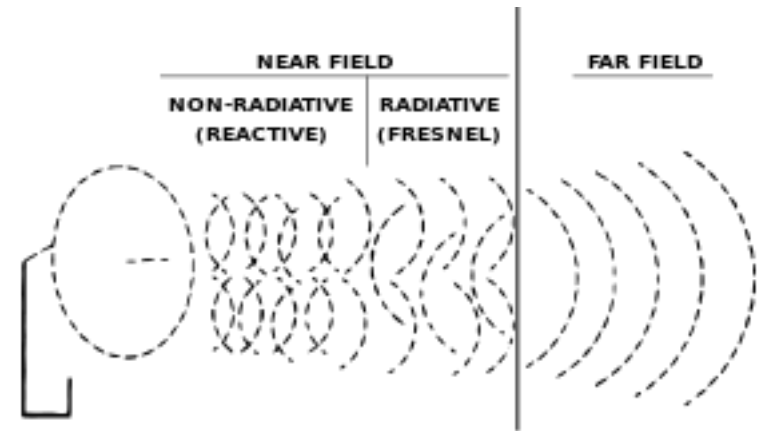
- ▶ AC Electromagnetic Fields are created by alternation of polarity (positive to negative to positive) of AC electricity on electric power lines, circuits and power cords, at 60 times per second
- ▶ The “M” in EMF is the magnetic field component
- ▶ The “E” in EMF is the electric field component
- ▶ These fields emit off power lines, circuits and power cords at right angles to each other
- ▶ They enter our living space and can affect our health



www.ixquick.com

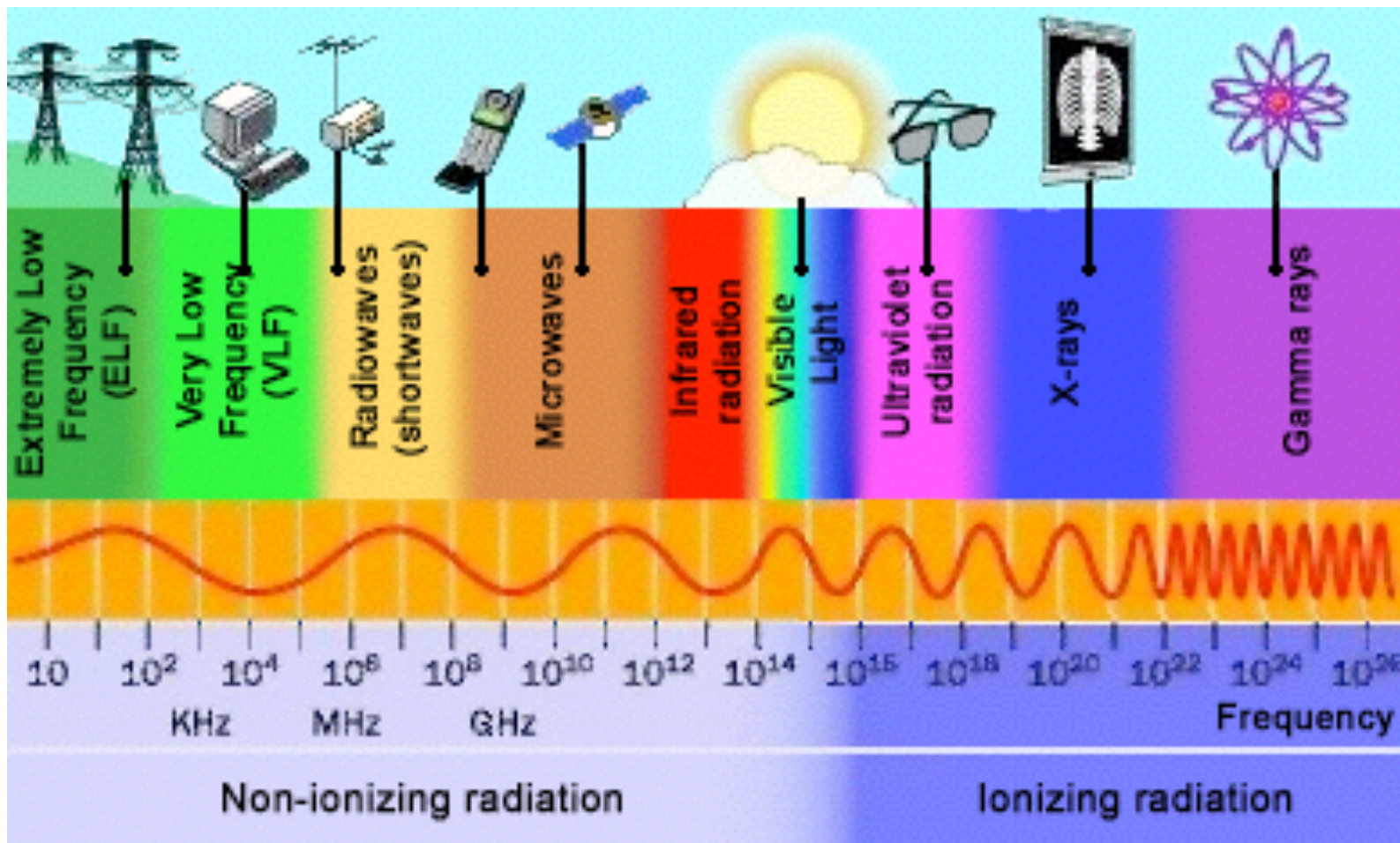
Electric & Magnetic Field (EMF) Exposure

- ▶ Electric and magnetic fields are coupled in the far field
- ▶ Far field is defined as 3 or more wavelengths from source
- ▶ Within near field, electric and magnetic fields are uncoupled
- ▶ Wavelength for 60 Hz is 3,100 miles — we are always in near field
- ▶ EMFs from house wiring must be measured separately
- ▶ Can have electric field without magnetic field
- ▶ Electric fields are often missed (“unknown EMF”)



www.ixquick-proxy.com

Electro-Magnetic Spectrum



www.astrosurf.com

Credible Scientific Research

- ▶ The International Commission for Electromagnetic Safety www.icems.eu
- ▶ The Swedish Association for the ElectroSensitive http://www.feb.se/index_int.htm
- ▶ Powerwatch (UK) www.powerwatch.org.uk
- ▶ International EMF Alliance www.iemfa.org



FEB - The Swedish Association for the ElectroSensitive

Powerwatch

EMFScientist.org



International Electromagnetic Field Scientist Appeal
Over 200 scientists issued an appeal to the UN and WHO in May 2015 urging them to take action on health effects

www.emfscientist.org

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French Government Restricts Wi-Fi

“France law bans Wi-Fi in daycares, restricts wireless infrastructure”

– Le Monde, February 1, 2015

France law bans Wi-Fi in daycares, restricts wireless infrastructure

1 February 2015 at 10:07am | 🔥 11,935 hits

5.7k
SHARES

f Facebook

🐦 Twitter

+

by Pierre Le Hir, Le Monde | [see original article](#) | commentary: Arthur Firstenberg | translation: [André Fauteux](#)



LE SMACKDOWN EN WIFI: A new law in France bans Wi-Fi in childcare facilities, bans all advertising targeting children under 14, and requires the use of hand-free kits to be recommended.

French Government Restricts Wi-Fi

Features of the new legislation, enacted January 29, 2015:

- ▶ Banning of Wi-Fi in all daycare centers and nurseries for children under 3 years of age
- ▶ All Wi-Fi must be disabled on routers in grade school classrooms when not in use (they emit RF on standby)
- ▶ Prohibits cell phone advertising targeting children under 14
- ▶ Establishes “a precautionary approach addressing the potential health risks of radio frequencies”
- ▶ Prior notice to mayors of cell tower placement (allows citizen input—*not* allowed in the US for health reasons)

The BioInitiative Report



BioInitiative Report:

A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)

www.bioinitiative.org

The BioInitiative 2012 Report

1,800 New Studies Since 2007

- ▶ Effects on Fertility
- ▶ Effects on Fetus - behavioral problems in teens
- ▶ Leukemia and Childhood Cancers
- ▶ Genotoxicity
- ▶ Stress Proteins
- ▶ Immune Function
- ▶ Autism and Alzheimer's Disease
- ▶ Brain Tumors and Acoustic Neuromas
- ▶ DNA as fractal antenna

The BioInitiative 2012 Report

4+ pages of reported biological effects from Radiofrequency (RF) radiation at low-intensity exposure, *below* FCC safe exposure level

Power Density (Microwatts/centimeter ² - uW/cm ²)		Reference
0.5 uW/cm ²	Significant degeneration of seminiferous epithelium in mice at 2.45 GHz, 30-40 min.	Saunders, 1981
0.5 - 1.0 uW/cm ²	Wi-Fi level laptop exposure for 4-hr resulted in decrease in sperm viability, DNA fragmentation with sperm samples placed in petri dishes under a laptop connected via Wi-Fi to the internet.	Avendano, 2012
1.0 uW/cm ²	RFR induced pathological leakage of the blood-brain barrier	Persson, 1997
1.0 uW/cm ²	RFR caused significant effect on immune function in mice	Fesenko, 1999
1.0 uW/cm ²	RFR affected function of the immune system	Novoselova, 1999
1.0 uW/cm ²	Short-term (50 min) exposure in electrosensitive patients, caused loss of well-being after GSM and especially UMTS cell phone radiation exposure	Elititi, 2007
1.3 - 5.7 uW/cm ²	RFR associated with a doubling of leukemia in adults	Dolk, 1997
1.25 uW/cm ²	RFR exposure affected kidney development in rats (in-utero exposure)	Pyrpasopoulou, 2004
1.5 uW/cm ²	RFR reduced memory function in rats	Nittby, 2007
2 uW/cm ²	RFR induced double-strand DNA damage in rat brain cells	Kesari, 2008
2.5 uW/cm ²	RFR affected calcium concentrations in heart muscle cells	Wolke, 1996
2 - 4 uW/cm ²	Altered cell membranes; acetylcholine-induced ion channel disruption	D'Inzeo, 1988
4 uW/cm ²	RFR caused changes in hippocampus (brain memory and learning)	Tattersall, 2001
4 - 15 uW/cm ²	Memory impairment, slowed motor skills and retarded learning in children	Chiang, 1989
5 uW/cm ²	RFR caused drop in NK lymphocytes (immune function decreased)	Boscolo, 2001
5.25 uW/cm ²	20 minutes of RFR at cell tower frequencies induced cell stress response	Kwee, 2001
5 - 10 uW/cm ²	RFR caused impaired nervous system activity	Dumansky, 1974
6 uW/cm ²	RFR induced DNA damage in cells	Phillips, 1998

www.bioinitiative.org

Oram Miller, BBEC, EMRS

Actions by European Governments in Response to Original Bio-Initiative Report

“EU calls for urgent action on wi-fi radiation” – The New Zealand Herald, 9/16/07

- “Europe's top environmental watchdog is calling for immediate action to reduce exposure to radiation from Wi-Fi, mobile phones and their masts (towers). It suggests that delay could lead to a health crisis similar to those caused by asbestos, smoking and lead in petrol.”



“Council of Europe calls for dramatic reduction in EMF exposure”

“Non-ionizing frequencies... appear to have more or less potentially harmful, non-thermal, biological effects on... the human body, even when exposed to levels that are below the official threshold values...

“There could be extremely high human and economic costs if early warnings are neglected...

“Take all reasonable measures to reduce exposure to electromagnetic fields...

“Reconsider the scientific basis for the present standards on exposure to electromagnetic fields...



Council of Europe

“Council of Europe calls for dramatic reduction in EMF exposure”

“Put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects...”

“Encourage research to develop telecommunication based on other technologies...”

“Pay particular attention to ‘electrosensitive’ people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network...”

“Undertake appropriate risk-assessment procedures for all new types of device prior to licensing...”



Council of Europe

“Council of Europe calls for dramatic reduction in EMF exposure”

“Introduce clear labeling indicating the presence of... electromagnetic fields, the transmitting power or the specific absorption rate (SAR)... and any health risks connected with its use...”

“Recommend the use of wired, fixed telephones at home...”

“For children in general, and particularly in schools and classrooms, give preference to wired Internet connections...”

“Pay heed to and protect ‘early warning’ scientists...”

“Increase public funding of independent research...”

- Adopted May 2011



Council of Europe

Covered by Major Newspapers in London

“Ban mobile phones and wireless networks in schools, say European leaders”

- London Telegraph, May 14, 2011

<http://www.telegraph.co.uk/technology/mobile-phones/8514380/Ban-mobile-phones-and-wireless-networks-in-schools-say-European-leaders.html>

The Telegraph

Home Video News World Sport Finance Comment Culture Travel Life Women Fashion
Apple iPhone Technology News Technology Companies Technology Reviews Video Games Technology

HOME » TECHNOLOGY » MOBILE PHONES

Ban mobile phones and wireless networks in schools, say European leaders

Mobile phones and computers with wireless internet connections pose a risk to human health and should be banned from schools, a powerful European body has ruled.

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Mobile Phones

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“World Health Organization Classifies RF EMFs as Possible Cancer Risk”

- ▶ Resolution by the International Agency on Research on Cancer (IARC), May 31, 2011
- ▶ Reversal of previous position that cell phones were safe
- ▶ Exposure to wireless devices now "possibly" carcinogenic, Category 2(b)
- ▶ Similar to gasoline and DDT

International Agency for Research on Cancer



Interphone Study Group

“...the results will still only be **partial results**, publishing the data on gliomas and meningiomas but not the other tumor types studied...”

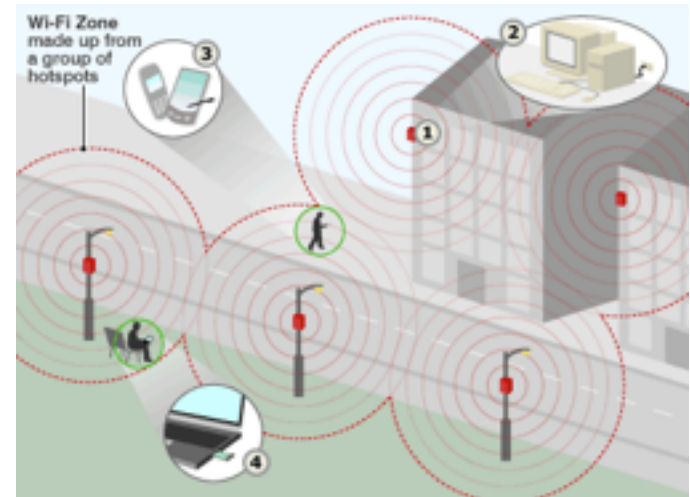
“Data collected on the 1,100 acoustic neuromas and 400 parotid gland tumors, or tumors that are closest to the ear, **will not be included** in the results...” (emphasis added)

– International EMF Collaborative Advisory on
Forthcoming Interphone Brain Tumor Study
www.electromagnetichealth.org, May 13, 2010

Electromagnetic
Health.org

Radio Frequency Field Exposure

- ▶ Considered to be “the largest human biological experiment ever” - Salford et. al.
- ▶ Evidence of harm is increasing worldwide
- ▶ Efforts are underway to remove Wi-Fi from schools, libraries and hospitals in Russia, Israel, Switzerland, Austria, France, Germany, Belgium, Ireland, India and Australia



Electric & Magnetic Field (EMF) Exposure

- ▶ Considered by industry and FCC to be relatively harmless
- ▶ A potentially significant health risk to everyone, like cigarettes in 1950s and 60s
- ▶ Most research comes from Europe
- ▶ Europe, Israel, Russia, India limiting Wi-Fi and alerting citizens to dangers of RF
- ▶ Yet US is promoting Wi-Fi for everything
- ▶ EMFs interfere with healing and treatment from health care practitioners
- ▶ Most people improve with reduction in EMF exposure



Sources of Radio Frequency Field Exposure Indoors

- ▶ Wi-Fi routers and laptops
- ▶ Cordless telephone base station is “always on”
- ▶ Both emit continuous pulsed digital carrier frequencies in standby mode
- ▶ Think of them like ashtrays with burning lit cigarettes, filling room with smoke



velocidaddeinternet.com



china-telecommunications.com



photographersdirect.com

Sources of Radio Frequency Field Exposure Inside Home

- ▶ Tablets
- ▶ e-Readers
- ▶ Smart Electric Meters



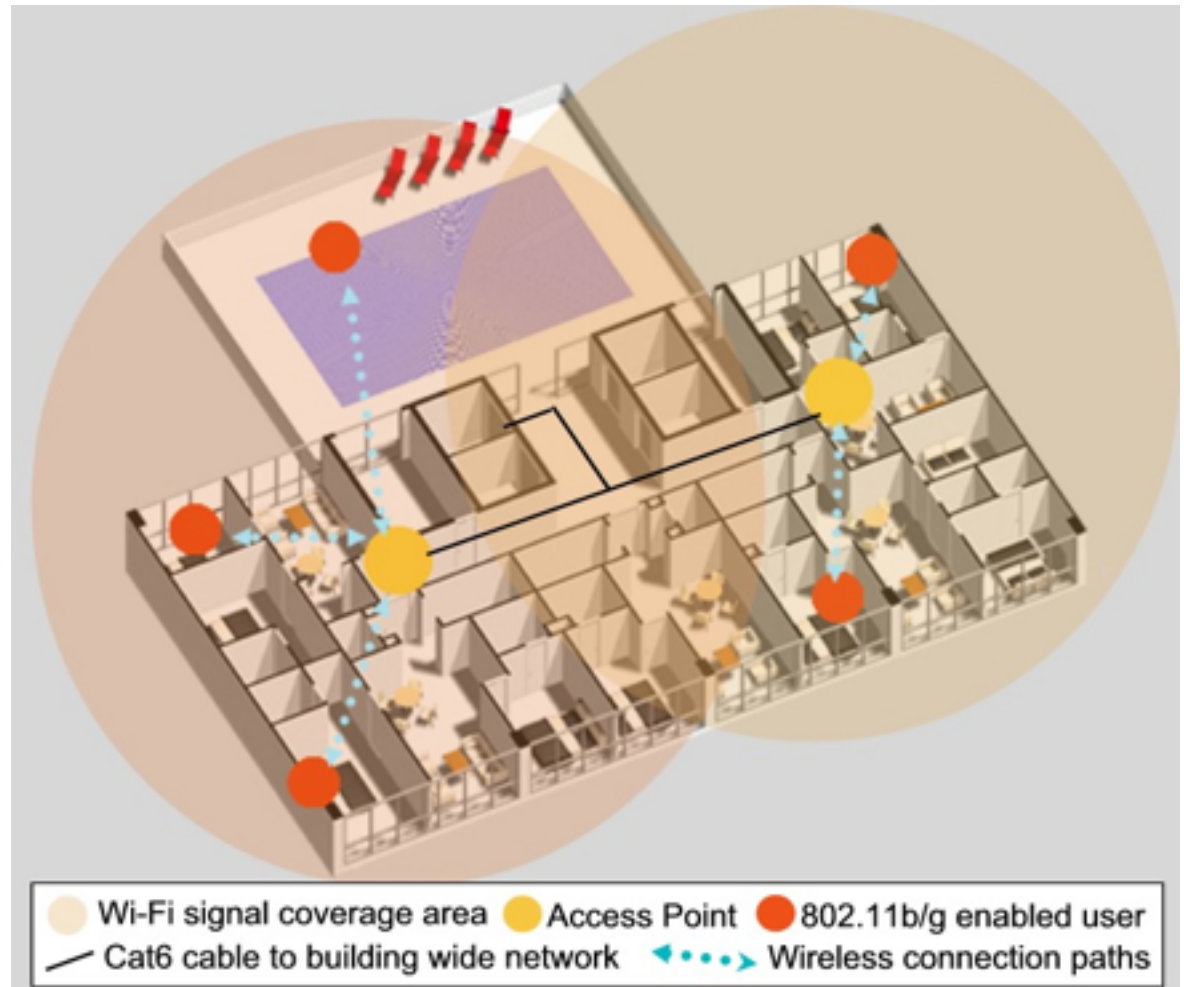
www.nickolexie.en.busytrade.com



en.wikipedia.org

Sources of Radio Frequency Field Exposure Inside Home and Office

Exposure from Wi-Fi router “nodes”



EMF Meters and Instruments

Radio Frequency (RF) Fields

- ▶ Hand-held Meters
- ▶ Pay attention to frequency range



Cornet RF Meter



Gigahertz Solutions HF35C



3-Axis RF Meter

Sources of Radio Frequency Field Exposure Outdoors

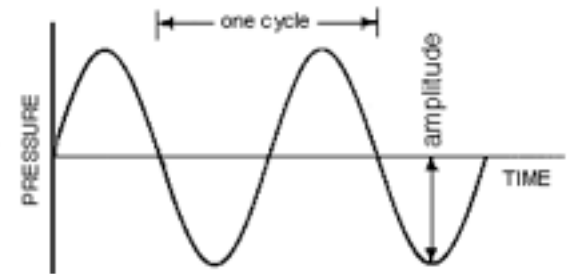
- ▶ Radio and TV broadcast towers
- ▶ Cell phone antennas
- ▶ Smart Utility Meters
- ▶ Wi-Fi routers in neighbors' homes and businesses



Radio Frequency Field Exposure

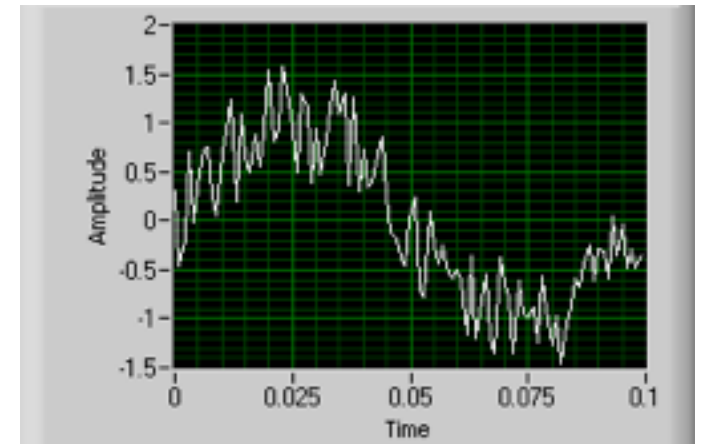
Harm comes from:

- ▶ Frequency
- ▶ Power Output
- ▶ Distortion of Waveform
- ▶ Smooth analog wave form is best
- ▶ Pulsed digital frequencies interfere with biological functions
- ▶ Effects are cumulative



www.sfu.ca

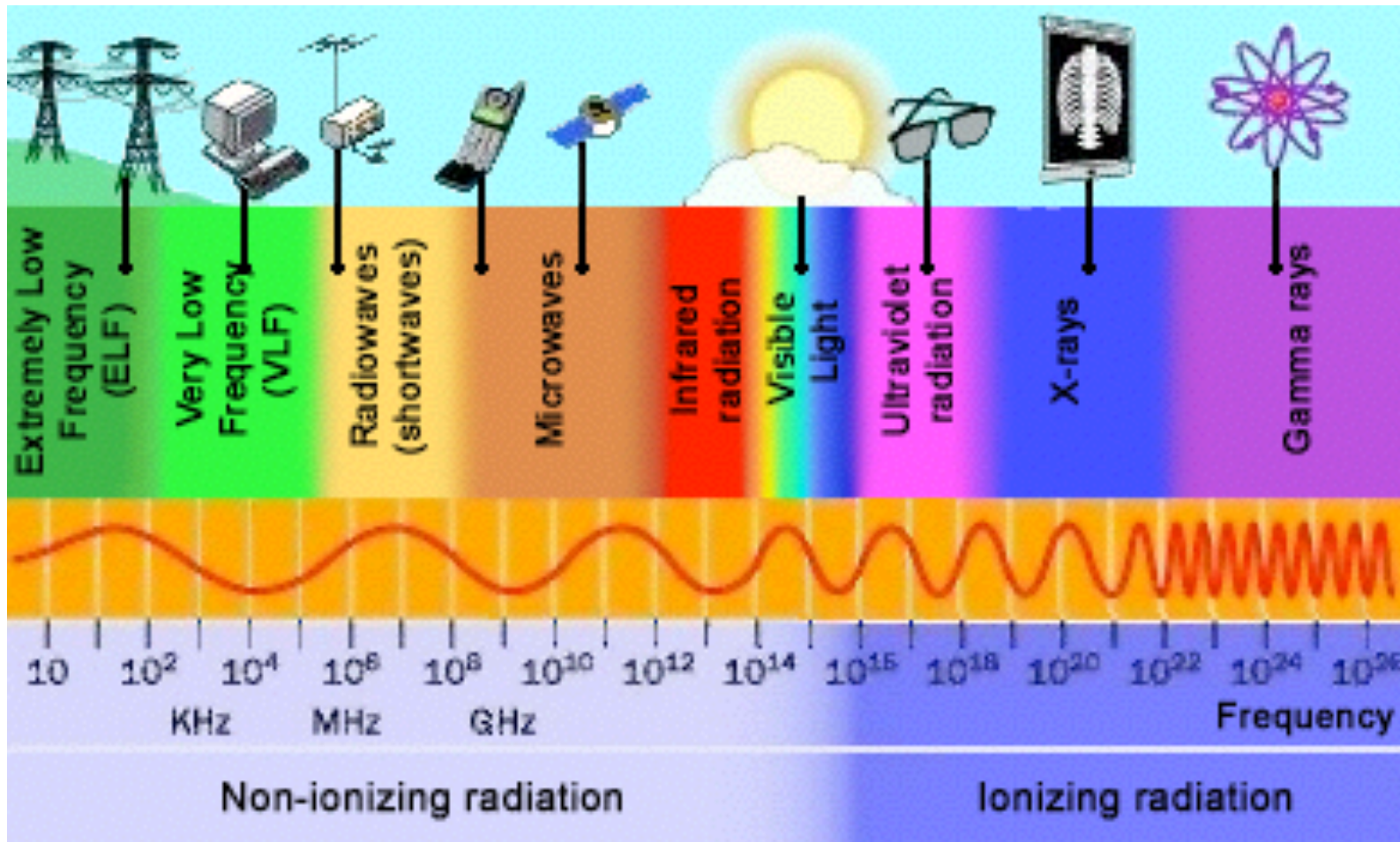
Smooth Analog Signals –
Well Tolerated



Zone.ni.com

Pulsed Digital Signals –
Not Well Tolerated

Electro-Magnetic Spectrum



www.astrosurf.com

“Membrane Sensitivity Syndrome”

Dr. George Carlo

Four biological “effect windows” on human health:

1. Ionizing Radiation: X-rays, gamma rays and cosmic rays at 10^{22} - 10^{24} Hz – breaks DNA bonds, but has safe exposure level
2. Electric Fields and Magnetic Fields at 60 Hz – causes headaches, insomnia, chronic fatigue, fibromyalgia, but has safe exposure level
3. Carrier Wave Frequencies of wireless devices in microwave range at 800 Mz - 5.8 GHz – causes thermal (heating) effects on cells, but has safe exposure level (SAR)
4. “Information-carrying radio waves” at low frequencies (16 Hz & 219-230 Hz) – causes athermal, non-heating biological effects on cell membrane and DNA

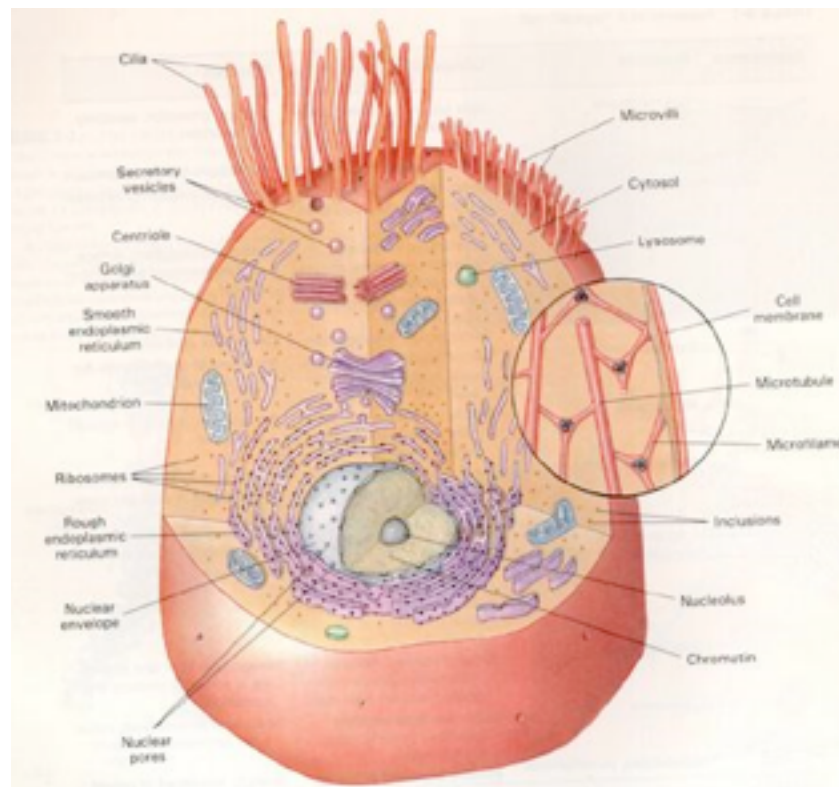
No safe exposure limits to effects of information carrying radio waves

Non-thermal, biological effects are cumulative

“Membrane Sensitivity Syndrome”

Dr. George Carlo

Cell membrane affected by low-frequency EMFs



<http://homepages.cwi.nl/~gollum/SiC/PICT/CELL.jpg>

Health Effects of Radio Frequency (RF) Field Exposure

“In the past twelve years there have been hundreds of studies showing these non-thermal effects:

- ▶ DNA damage and non-repair
- ▶ Opening of the blood-brain barrier (toxins enter)
- ▶ Lowered immunity
- ▶ Decreased melatonin levels
- ▶ Effects on stress proteins (indicating cell damage)
- ▶ Formation of micro-nuclei (markers for cancer)
- ▶ Changes in calcium metabolism
- ▶ Changes in brainwave patterns seen on EEG”

— Margaret Meade Glaser, EMR Network

Health Effects of Radio Frequency (RF) Field Exposure

Types of cancer linked to cell phone use:

- ▶ Glioma (Brain Cancer)
- ▶ Acoustic Neuroma (tumor on acoustic nerve)
- ▶ Meningioma (tumor of the meninges)
- ▶ Salivary Gland cancer (parotid gland in cheek)
- ▶ Eye Cancer
- ▶ Testicular Cancer
- ▶ Leukemia
- ▶ Thyroid Cancer
- ▶ Breast Cancer

— Children's Health Expert Panel, Stonington, CT, June 28, 2013

Health Effects of Radio Frequency (RF) Field Exposure

Research on cancer–cell phone link

- ▶ Children and teenagers five times more likely to develop brain cancer if they use mobile phones – Professor Lennart Hardell, University Hospital, Orebro, Sweden
- ▶ Brain cancer increasing past ten years, particularly among 20-29 year olds – Dr. Ronald Herberman
- ▶ Cell phone radiation can cause DNA breaks – Science
- ▶ Ten or more years cell phone use doubles glioma risk – Interphone Study
- ▶ Cell phones related to increased brain tumors, genotoxicity, childhood leukemia, and adult cancers – Bioinitiative 2012 Report

Health Effects of Radio Frequency (RF) Field Exposure

“What Americans need to know, and are not being told, is that three out of four independent (non-industry sponsored) research studies worldwide are showing biological effects from low-level, non-ionizing radiation similar to that used in wireless communications. These are called ‘nonthermal’...The telecom industry, and the FCC’s safe exposure guidelines, recognize only thermal ‘heating’ effects. That means that exposure at intensity (power) levels below that threshold are officially being considered ‘safe’ while the research is suggesting otherwise.”

— Margaret Meade Glaser, EMR Network



FCC Versus the Rest of the World

- ▶ FCC's safe exposure guidelines for cell phones listed at 1.0 milliWatts/centimeter squared (mW/cm^2)
- ▶ Yet that translates to 10 *million* microWatts/meter squared ($\mu\text{W}/\text{m}^2$), the units used by rest of the world
- ▶ Other countries recommend lower RF safe exposure levels than the US
- ▶ Building Biology recommends RF levels of one hundred thousand to one million times less than FCC (100-10 $\mu\text{W}/\text{m}^2$ or 0.000,1-0.000,001 mW/cm^2)
- ▶ FCC's guidelines based solely on thermal effects; ignore non-thermal, biological effects

Official FCC Safe Exposure Guidelines for Radio Frequencies (RF)

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)
(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E/2, H/2 or S (minutes)
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000 (1.5-100 GHz)	--	--	1.0	30

Conversion Table

milliWatts per square centimeter	microWatts per square meter
0.000,000,01 mW/cm ²	0.1 μW/m ²
0.000.000,1 mW/cm ²	1 μW/m ²
0.000,001 mW/cm ²	10 μW/m ²
0.000,01 mW/cm ²	100 μW/m ²
0.000,1 mW/cm ²	1,000 μW/m ²
0.001 mW/cm ²	10,000 μW/m ²
0.01 mW/cm ²	100,000 μW/m ²
0.1 mW/cm ²	1,000,000 μW/m ²
1.0 mW/cm²	10,000,000 μW/m²
10 mW/cm ²	100,000,000 μW/m ²
100 mW/cm ²	1,000,000,000 μW/m ²
1,000 mW/cm ²	10,000,000,000 μW/m ²
10,000 mW/cm ²	100,000,000,000 μW/m ²

Comparative Chart on International Safe Exposure Guidelines

1800 MHz Public Exposure Guidelines	PFD $\mu\text{W}/\text{m}^2$	Equivalent V/m	c.f. speed m.p.h.
FCC (USA) OET-65	10,000,000	61	3000
ICNIRP (1998), WHO	9,000,000	58	2847
Belgium (exc Wallonia)	1,115,000	21	1002
Italy (sum of frequencies)	100,000	6	300
Russia, PRChina	100,000	6	300
Switzerland, Lichtenstein, Luxembourg	95,000	6	292
Belgium Wallonia	24,000	3	147
Typical 100m from a base station (0.2 to 6 V/m)	10,000	1.9	95
Vienna (sum GSM)	10,000	1.9	95
Italy (single frequency)	1,000	0.6	30
Salzburg 1998 (sum GSM)	1,000	0.6	30
EU-Parl, GD Wissenschaft, STOA GSM (2001)	100	0.2	9
Median level, 15 US cities 1977 (mainly VHF & TV)	48	0.14	7
Salzburg GSM/3G outside houses (2002)	10	0.06	3
Salzburg GSM/3G inside houses (2002)	1	0.02	1
Burgerforum BRD proposal, waking areas (1999)	1	0.02	1
Burgerforum BRD proposal, sleeping areas (1999)	0.01	0.002	0.1

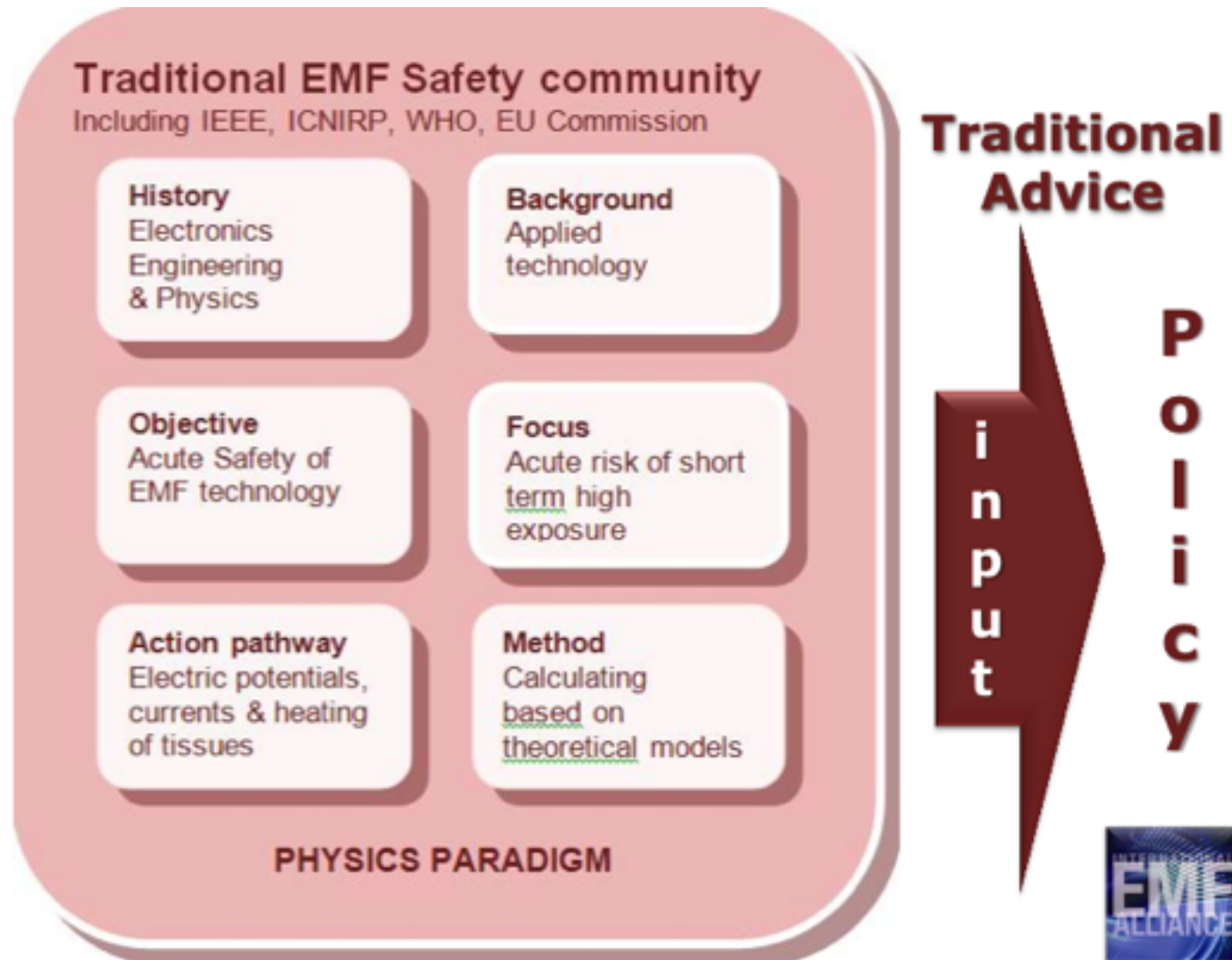
Building Biology Safe Exposure Guidelines for RF

Building Biology Evaluation Guidelines for Sleeping Areas,
SBM-2008, Page I

Radiofrequency Radiation (High Frequency, Electromagnetic Waves)

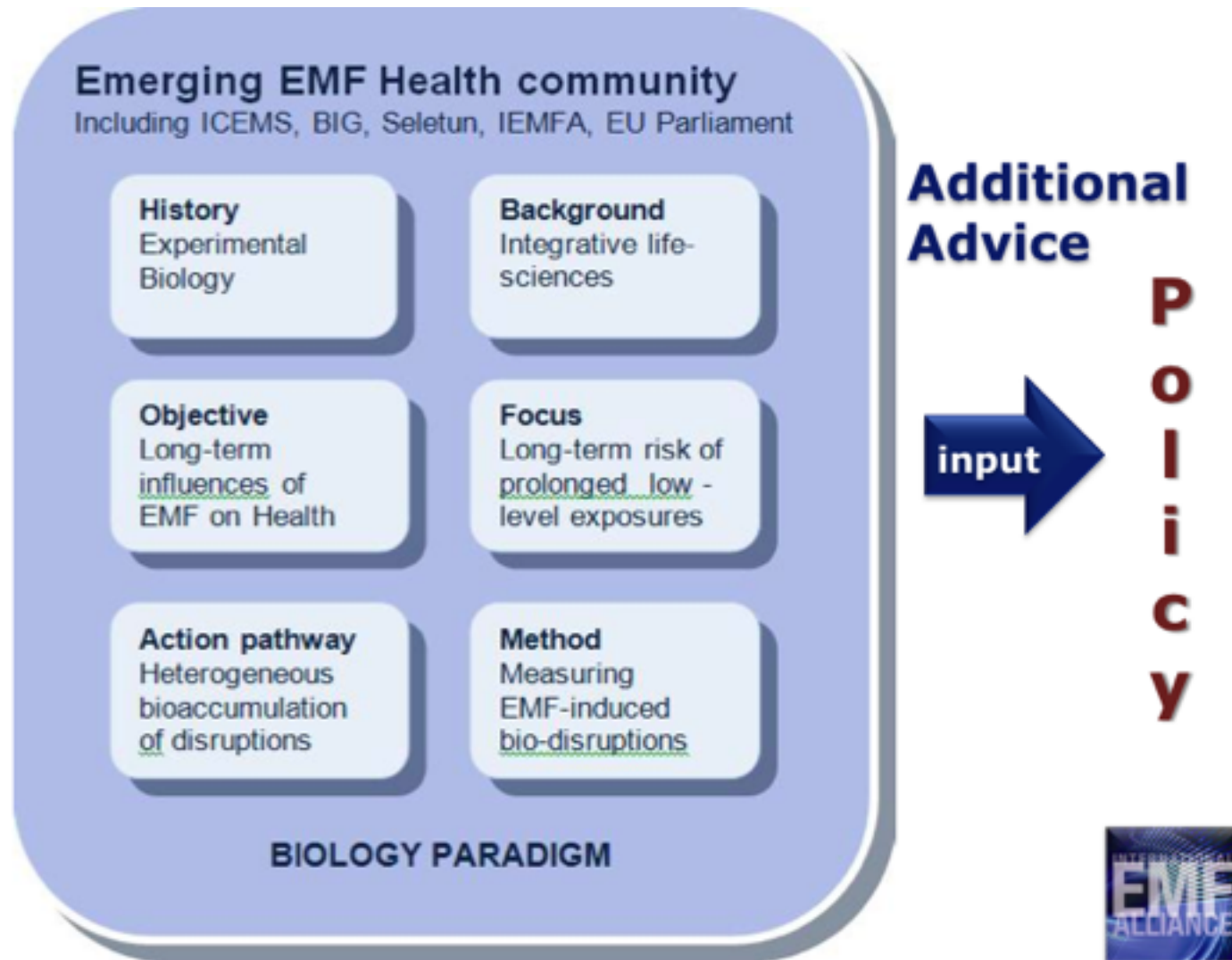
	No Anomaly	Slight Anomaly	Severe Anomaly	Extreme Anomaly
Power Density in microWatts/meter squared ($\mu\text{W}/\text{m}^2$)	< 0.1	0.1 - 10	10 - 1,000	> 1,000

Comparing EMF Paradigms



www.international-emf-alliance.org

Comparing EMF Paradigms



www.international-emf-alliance.org

Health Effects of Radio Frequency (RF) Field Exposure — Summary

- ▶ Thermal (heating) and non-thermal (non-heating) frequencies both cause health effects
- ▶ Pulsed digital frequencies and distortion of the wave form cause biological harm
- ▶ Safe exposure limits from emerging EMF community are biology-based, not just based upon tissue heating
- ▶ Effects drop off exponentially with distance away from source; look for additional sources of EMFs in house
- ▶ Review “Cell Phone and Radio Frequency Risks” and “Articles on EMFs” on www.createhealthyhomes.com

The Bottom Line

If you use a cell phone, cordless phone, tablet, laptop or have a smart meter, you must ask yourself:



turbohealthcare.com

“How many cigarettes am I willing to smoke on a daily basis?”

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Reduce Use
- ▶ Increase Distance
- ▶ Favor Hardwired Connections
- ▶ Prefer speakerphone and texting
- ▶ Air tube earphone for cell phones and cordless telephones
www.lessemf.com
- ▶ Place “snap bead” on earphone cord
www.lessemf.com



Ferrite “Snap”
Bead



RF3 Air Tube Ear Phone

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Keep your landline telephone and use it
- ▶ Use corded telephones rather than cordless
- ▶ Tell family and friends to call your home landline corded telephone number first
- ▶ Hardwired network using Ethernet cables
- ▶ Must disable Wi-Fi on router *and* computer
- ▶ Put tablet, e-Reader, laptop & cell phone in Airplane mode when not receiving or transmitting



Corded Telephone



CAT-5e or 6 Wiring

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Internet network should ideally be hardwired using Ethernet cable, creating Local Area Network, or LAN
- ▶ Use Ethernet cables to connect devices (computers, printers, TVs) to router
- ▶ Amazon sells 50 and 100 foot Ethernet cables for less than \$13
- ▶ Use data switch for multiple computers, printers in one room



www.amazon.com



www.amazon.com

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ If not electrically hypersensitive (EHS) and installing Ethernet network is not affordable, use pair of network adapters
- ▶ Netgear Powerline 200 or 500 Mbps
- ▶ Avoid models with Wi-Fi on second adapter
- ▶ This technology does generate dirty electricity on house circuits



www.amazon.com

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Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ MOCA (Multi-media Over Cable Alliance) technology should be tolerated by electrically hypersensitive individuals
- ▶ Uses existing co-axial TV cables already in walls
- ▶ Co-axial cable is shielded
- ▶ No dirty electricity generated
- ▶ Can still run television signals through co-axial cable using splitter



Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ You *must* manually disable Wi-Fi on router *and* laptop or desktop computer to get rid of Wi-Fi radio frequencies
- ▶ Plugging in Ethernet cable will *not* automatically disable Wi-Fi on its own on either your router or your laptop
- ▶ Consult with router's manufacturer, manual, or Internet Technology (IT) person to help disable Wi-Fi on router and computer



iccinforcentre.com



piratstudenterna.se

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ No cordless keyboard and mouse
- ▶ Replace with *corded* keyboard and mouse
- ▶ Disable Bluetooth on computer
- ▶ Turn off power on cordless keyboard and mouse — will still transmit in the drawer



en.wikipedia.org



ebay.pl

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Mac Air and Macbook have no Ethernet port
- ▶ Use Thunderbolt-to-Ethernet adapter or USB-to-Ethernet adapter



www.apple.com



www.apple.com



iphonehoesjeshop.nl

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Hardwired workaround for iPad and iPhone
- ▶ Put in Airplane mode — Get Internet without radio waves
- ▶ Go to Safer Use of Computers at www.createhealthyhomes.com



gottabemobile.com



www.amazon.com



www.amazon.com



www.amazon.com



iphonehoesjeshop.nl

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Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Avoid Wi-Fi by providing hardwired Ethernet connection to TV for streaming video for Netflix, Hulu
- ▶ Plug Ethernet cable into Roku 1 or 2 or Apple TV device
- ▶ Automatically disables Wi-Fi on Roku 1 & 2 and Apple TV 1 & 2
- ▶ With Apple TV 3, must disable Airplay with onscreen command
- ▶ Cannot disable Wi-Fi on Roku 3. We recommend not using
- ▶ Verify that Wi-Fi is disabled with RF detector, if you have one



commons.wikimedia.org



zdnet.com

Protect Yourself from Harmful Radio Frequency Fields from Cell Towers

- ▶ Look up location of cell antennas and broadcast antennas near your home
- ▶ www.antennasearch.com



Steelintheair.com



Longdistancecarriers.us

Protect Yourself from Smart Utility Meters

- ▶ Smart Electric, Gas and Water meters now installed in Southern California and throughout most of the country
- ▶ Emit harmful “beacon signals” throughout the day and night to “synchronize” smart meters in mesh network
- ▶ Emit much stronger radio frequency signals one or more times per day to transmit data to home office
- ▶ Short (20-40 microSeconds), sharp/fast rise time and persistent (24/7) nature of beacon signals make smart meters more harmful than Wi-Fi, cell phones



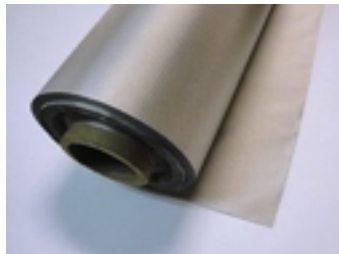
Protect Yourself from Harmful Radio Frequency Field Exposure

Block RF from outside sources (cell towers, smart meters, radio & TV towers):

- ▶ RF reflecting paint
- ▶ Fabric, bed canopy
- ▶ Metal window screen or film on windows

▶ www.lessemf.com

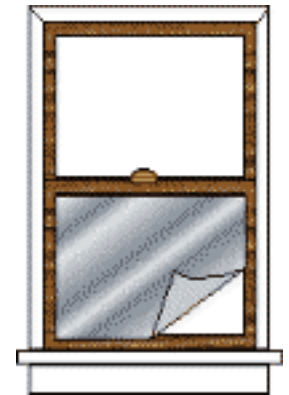
▶ www.safelivingtechnologies.com



RF Shielding Materials & Fabrics



Y-shield® Paint



Scotchint® Window Film



Bed Canopy

Sources of Dirty Electricity Exposure

- ▶ Electronic dimmer switches
- ▶ Compact Fluorescent Lamps (CFLs)
- ▶ Switched Mode Power Supplies



www.conrad.com

Protect Yourself from Harmful “Dirty Electricity” Exposure

- ▶ Ideally eliminate sources
- ▶ Avoid Compact Fluorescent Lamps
- ▶ Use full spectrum incandescent bulbs
- ▶ LED bulbs (“line-voltage,” non-transformer bulbs)
- ▶ Install straight on/off switches rather than dimmer switches
- ▶ Then use Dirty Electricity Filters (repair wiring errors first)

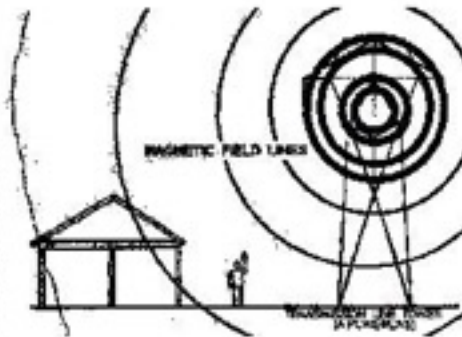


Chips and Pendants

- ▶ I believe they are useful
- ▶ Building Biology profession now has a position paper at hbelc.org
- ▶ No measurable change with EMF meters
- ▶ Research does support their use:
- ▶ Less damage to rat DNA, less rouleaux formation (clumping of red blood cells on live cell analysis), blues and greens (cooling of tissues) vs. reds and yellows (heating of tissues) on thermography
- ▶ Thousands of testimonials
- ▶ Do not use as exclusive means of protection

COMPARISON OF AC MAGNETIC AND AC ELECTRIC FIELDS

MAGNETIC FIELDS

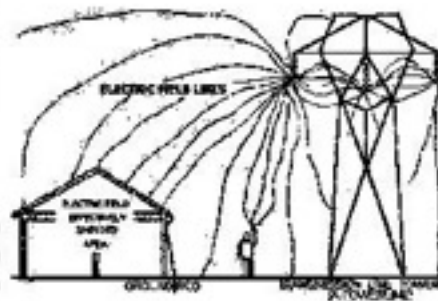


ARE THE ENERGIZATION OF THE SPACE AROUND ELECTRIC CURRENT FLOW

PRODUCED BY
ELECTRIC
CURRENT FLOW

DETECTED/ MEASURED BY:
GAUSSMETER/ AMP METER

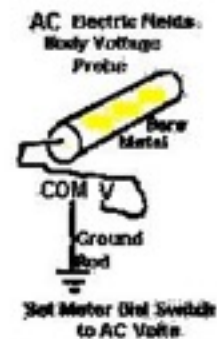
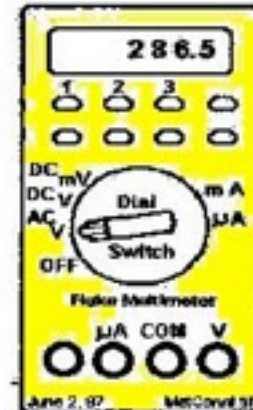
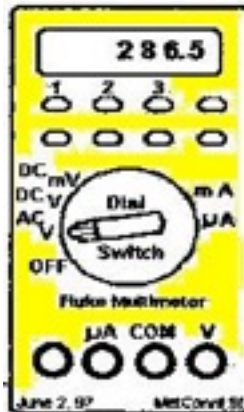
ELECTRIC FIELDS



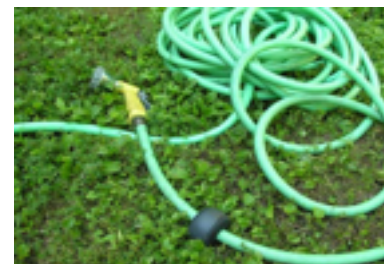
ARE THE ENERGIZATION OF THE SPACE BETWEEN VOLTAGE DIFFERENCES

PRODUCED BY
VOLTAGE

DETECTED/ MEASURED BY:
VOLT METER



28-Fs

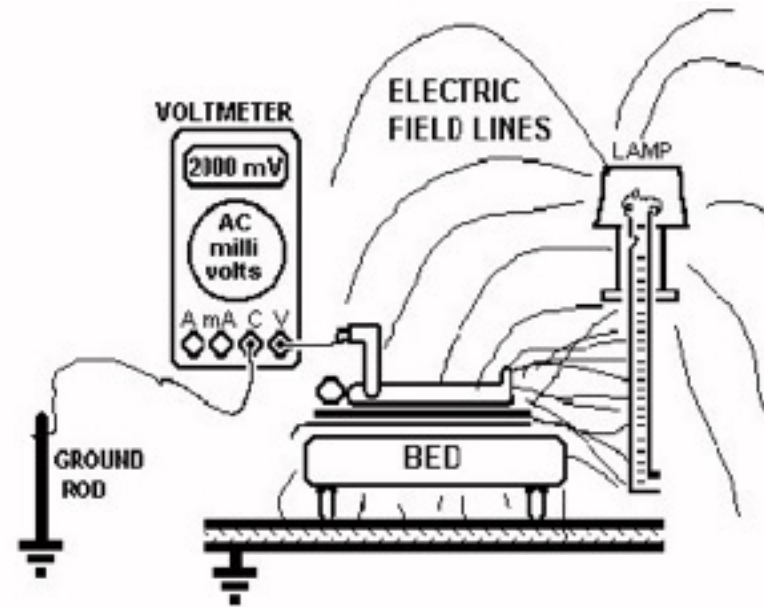


Courtesy
Spark
Burmester,
EE, BBEC

Oram Miller, BBEC, EMRS

AC Electric Field Basics

- ▶ Produced by differences in electric voltage
- ▶ Measured with Volt meter (not Gauss meter)
- ▶ Similar to *pressure* in water hose (not flow)
- ▶ The “Unknown EMF”
- ▶ Independent of AC Magnetic Fields



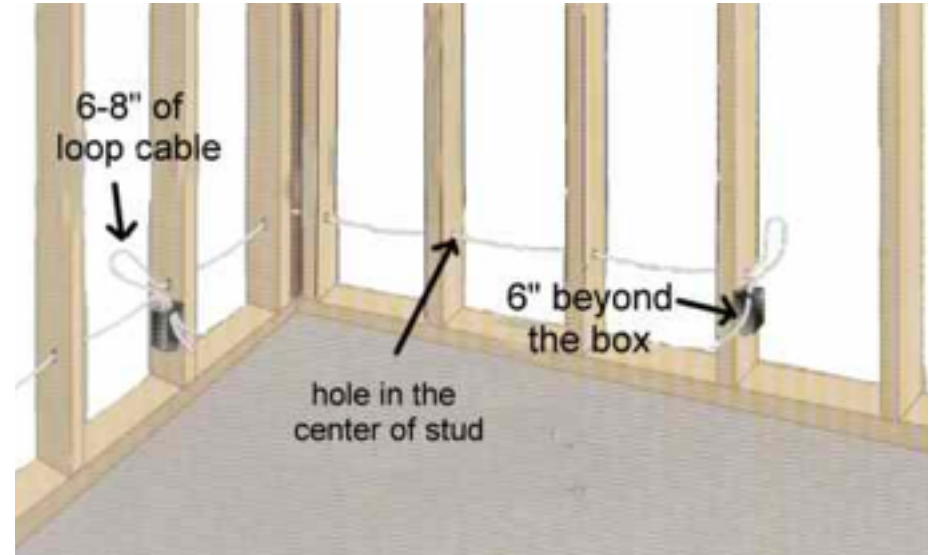
Courtesy Spark Burmaster, EE, BBEC



Oram Miller, BBEC, EMRS

Sources of AC Electric Field Exposure

- ▶ AC Electric fields present even if current is not flowing (e.g., lamp is off)
- ▶ Extends up to 6-8 feet from plastic-jacketed wiring (Romex) in walls
- ▶ Also extends 6-8 feet from unshielded AC power cords
- ▶ Decreases with distance
- ▶ Fields are present even when these devices are turned off but plugged in
- ▶ Affects people primarily while sleeping



Unshielded Romex Wiring



Bedside Lamp Cord

www.etsy.com

Sources of AC Electric Field Exposure

Large electric field exposure from:

1. Electric blankets
2. Electric heating pads
3. Water bed heaters

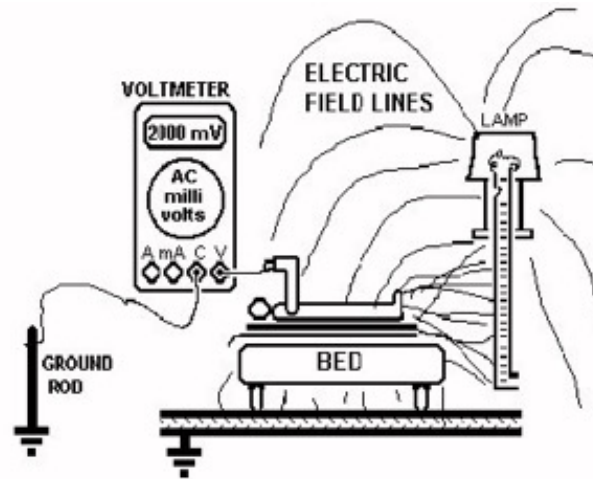
Fields are present even when these devices are turned off but plugged in



EMF Meters and Instruments

Electric Fields

- ▶ Body Voltage Meter
- ▶ Hand-held Meter



Courtesy Spark Burmaster, EE, BBEC



Body Voltage Meters



Hand-held Meters

Building Biology Safe Exposure Guidelines for AC Electric Fields

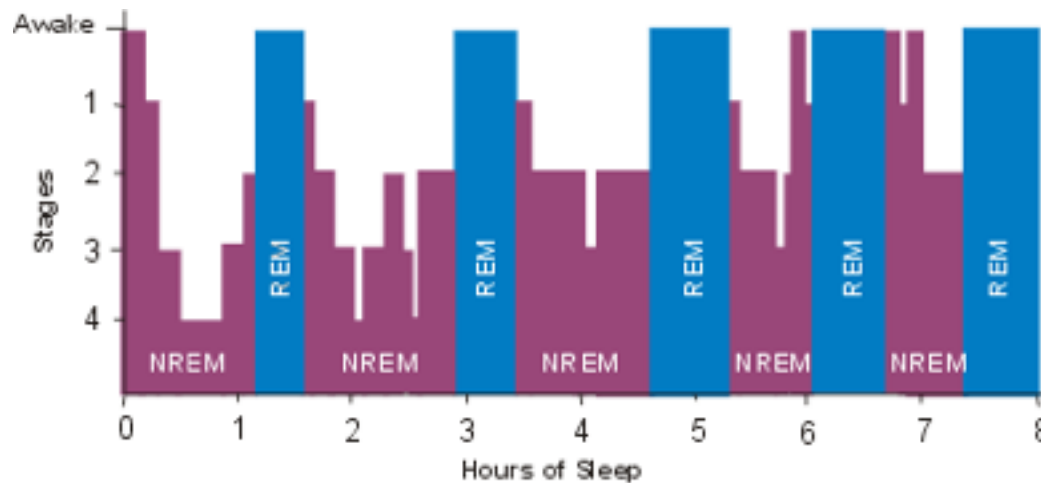
Building Biology Evaluation Guidelines for Sleeping Areas, SBM-2015

AC Electric Fields (Low Frequency, ELF/VLF)

	No Anomaly	Slight Anomaly	Severe Anomaly	Extreme Anomaly
Field Strength potential-free in Volt per meter (V/m)	< 0.3	0.3 - 1.5	1.5 - 10	> 10
Body Voltage with ground potential in milliVolt (mV)	< 10	10 - 100	100 - 1,000	> 1,000

Adverse Health Effects from Exposure to AC Electric Fields

- ▶ Prevents deep, Stage Four Sleep
- ▶ Diminishes normal night time production of melatonin
- ▶ Causes chronic fatigue, fibromyalgia, sleep disorders, restless leg syndrome, allergies
- ▶ Also hyperactivity, depression, headaches



Sequences of states and stages of sleep on a typical night

Oram Miller, BBEC, EMRS

Improvements With Reduction of AC Electric Fields

- ▶ Deeper levels of Stage Four sleep
- ▶ Increase in normal night time melatonin production
- ▶ Results in:

Increased vitality and alertness

Reduction of muscle pain and joint stiffness

Increase in flexibility and range of motion

Reduction of fatigue, allergies, depression, cancer

Greater response to medical therapies

Comments from Clients

- ▶ “My wife and I have not slept this soundly since we moved in!! ... I sleep undisturbed until 6:30 or 7 AM without interruption.”
– j.r., North Tustin
- ▶ "I'm sleeping better. I used to wake up 5-7 times a night. Now I wake up maybe once, and sometimes not at all... My husband's sleeping better, too. Seems to be a big difference.”
– n.j., Santa Ana
- ▶ "We slept so good. We shut off all necessary (marked) breakers. Just like you said, it felt like we were camping.”
– d.b., Long Beach

Reduce Electric Field Exposure — Plastic Romex Circuits in Walls

- ▶ Create an electrically clean sleeping environment
- ▶ If plastic-jacketed Romex circuits are in walls and floor, electric fields will extend 6-8 feet from circuits into bedroom
- ▶ Create zone without electric fields around, above, and below each bed
- ▶ Determine which circuit breakers to shut off by following protocol on EMF Meters and Instruments page at createhealthyhomes.com, in section on Electric Fields
- ▶ Remote shut-off switch and contactor can be installed to turn off circuits from bedroom



hdimagegallery.net

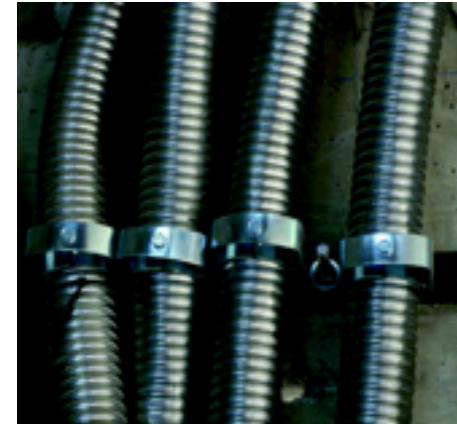


safelivingtechnologies.com

Oram Miller, BBEC, EMRS

Reduce Electric Field Exposure — Metal-Clad Circuits in Walls

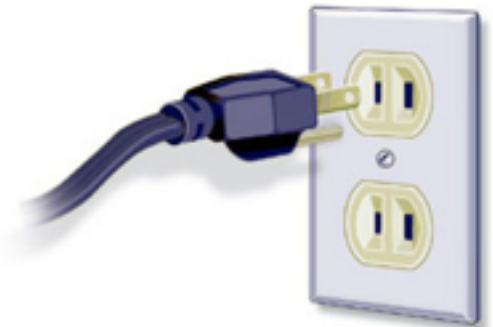
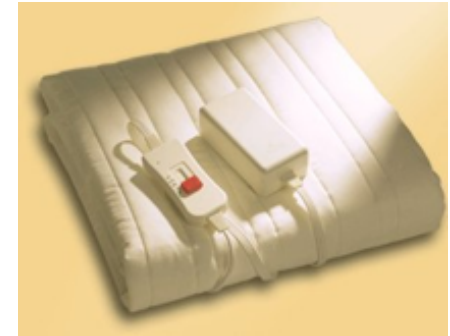
- ▶ Create an electrically clean sleeping environment
- ▶ If walls contain flexible steel or aluminum MC (metal clad) or rigid (EMT) conduits, there will not be any electric fields in the room
- ▶ You do not need to shut off breakers
- ▶ Use plug-in switches, shielded power strip
- ▶ Rewire lamps, appliances with shielded AC power cord (Mu Cord)



lessemf.com

Reduce Electric Field Exposure

- ▶ Avoid electric blankets and electric heating pads (watch for reverse polarity on non-polarized plug)
- ▶ Use battery-operated clocks
- ▶ Laptop AC power cords and refrigerator AC power cords both must be 3-pronged and outlets must be properly grounded



wurchelectric.com

Reduce Electric Field Exposure

Earthing Pad

- ▶ Thousands of testimonials from satisfied customers
- ▶ Brings beneficial negative ions from earth up to body (“earthing” versus “grounding”)
- ▶ However, shunts man-made electric fields to earth through your body from circuits in walls & AC cords
- ▶ This is a problem for electrically-sensitive people, as voltage runs through their body, even though “body voltage” meter shows low levels
- ▶ Best to reduce electric field exposure levels in bedroom first by shutting off circuits, then add earthing pad



radiantlifecatalog.com

Reduce Electric Field Exposure at Your Desk

Ungrounded Laptop AC Power Cords – PCs

- ▶ Big source of energy-draining, unhealthy electric fields
- ▶ Many laptops have two-pronged (ungrounded) plugs
- ▶ Plug needs to be three-pronged (grounded)
- ▶ Purchase USB Ground Cord from www.lessemf.com
- ▶ Also, outlet needs to be grounded
- ▶ Purchase circuit tester from hardware store to test ground at outlet – *both* amber lights need to be lit

Two-pronged plug:



www.ebay.com

Three-pronged plug:



www.popscreen.com



www.popscreen.com

Reduce Electric Field Exposure at Your Desk

Ungrounded Laptop AC Power Cords – Macs

- ▶ For Mac laptops, use the AC power adapter with the three-pronged plug
- ▶ Do not use the two-pronged adapter that slides directly into the transformer
- ▶ Pull the two-pronged adapter, shown on the left in the upper right corner, off the transformer, and slide on the cord shown on the right with the three-pronged plug
- ▶ Future models from Mac will not allow you to do this

Two-pronged plug:



laptopbatterylife.com

Three-pronged plug:



mactechgear.com

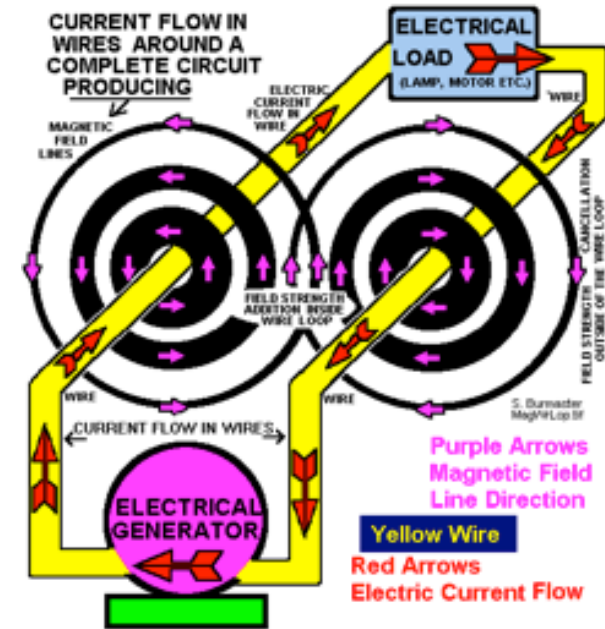


shop.accessory4you.com

Oram Miller, BBEC, EMRS

AC Magnetic Field Basics

- ▶ AC Magnetic Field exposure produced by current flow through a closed loop
- ▶ Occurs *only* when current is flowing
- ▶ Like *flow* of water through garden hose (not pressure)
- ▶ Independent of AC Electric Fields

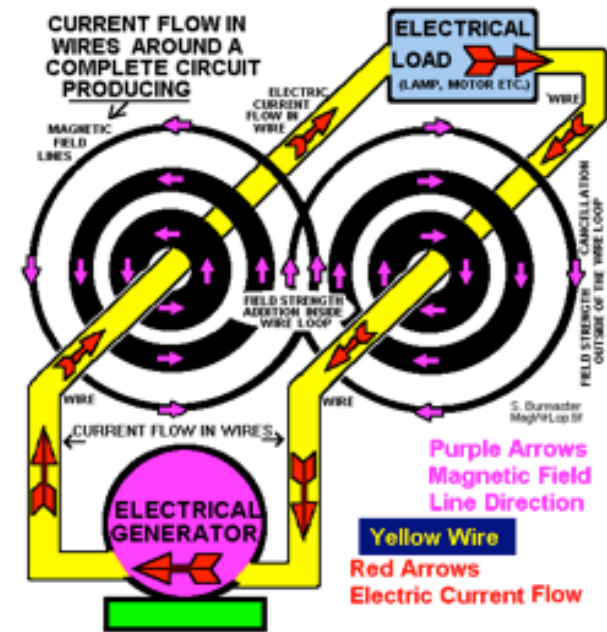


Courtesy Spark Burmaster, EE, BBEC

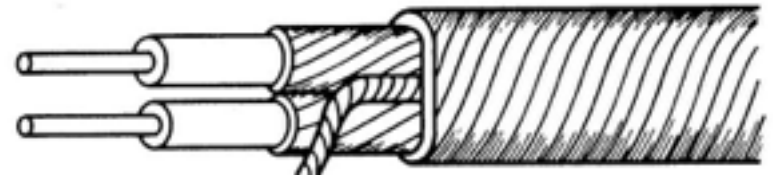


AC Magnetic Field Basics

- ▶ Field strength decreases with distance from source
- ▶ Extends only 2-4 feet from typical point sources (transformers, motors)
- ▶ Can extend 6-10 feet from current on grounding system or wiring errors
- ▶ Occurs when hot and neutral are separated — overhead power lines, knob and tube circuits
- ▶ Fields are cancelled when wires run together — modern Romex, flex

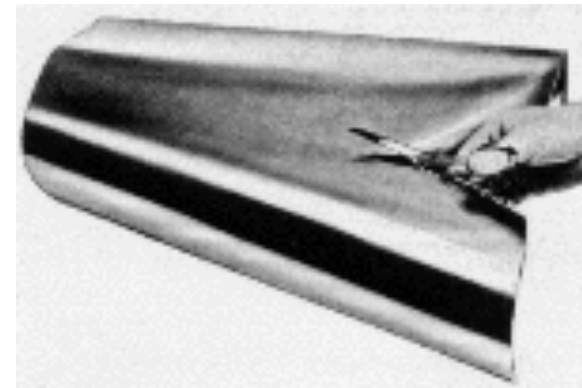


Courtesy Spark Burmaster, EE, BBEC, EMRS



AC Magnetic Field Basics

- ▶ Shielding is difficult and very expensive
- ▶ Requires special materials, such as Mu Metal www.lessemf.com
- ▶ Best to eliminate source or move yourself several feet away from source
- ▶ “Distance is your friend”



Mu Metal

EMF Meters and Instruments

Magnetic Fields

- ▶ Digital Gauss Meter, Gauss Master (single axis)
- ▶ FW Bell, Magnii Gauss Meters (triple axis)
- ▶ Tri-Field Flat Response model, *not* Frequency Weighted model (not recommended for measuring electric or radio frequency fields)
- ▶ “Buzz Stick”
- ▶ See EMF Meters and Instruments www.createhealthyhomes.com



Buzz Stick



Tri-Field Meter
Flat Response



Single Axis Gauss Meter



Gauss Master



FW Bell Gauss Meter



Magnii Gauss Meter

Building Biology Safe Exposure Guidelines for AC Magnetic Fields

Building Biology Evaluation Guidelines for Sleeping Areas,
SBM-2015

AC Magnetic Fields (Low Frequency, ELF/VLF)

	No Anomaly	Slight Anomaly	Severe Anomaly	Extreme Anomaly
Flux Density in milliGauss (mG)	< 0.2	0.2 - 1	1 - 5	> 5

Sources of AC Magnetic Field Exposure

Four major sources of AC magnetic fields in homes:

1. Overhead outside power lines, especially high tension power lines – wires are widely separated



2. Point sources: motors (refrigerator), transformers (black box, inside stereo, TV, clock radio), electric meter, breaker panel



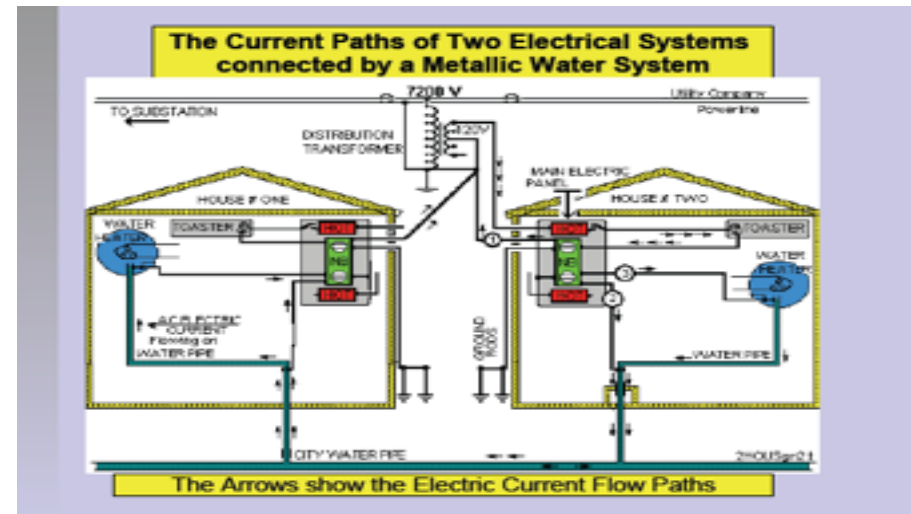
Sources of AC Magnetic Field Exposure

Major sources in homes (continued):

3. Wiring errors in branch circuits – parallel paths; Knob & Tube wiring – conductors are separated



4. Current on grounding system— parallel return paths to transformer. Flows from neighbor's homes on incoming water pipes; also on cable TV line sheathing

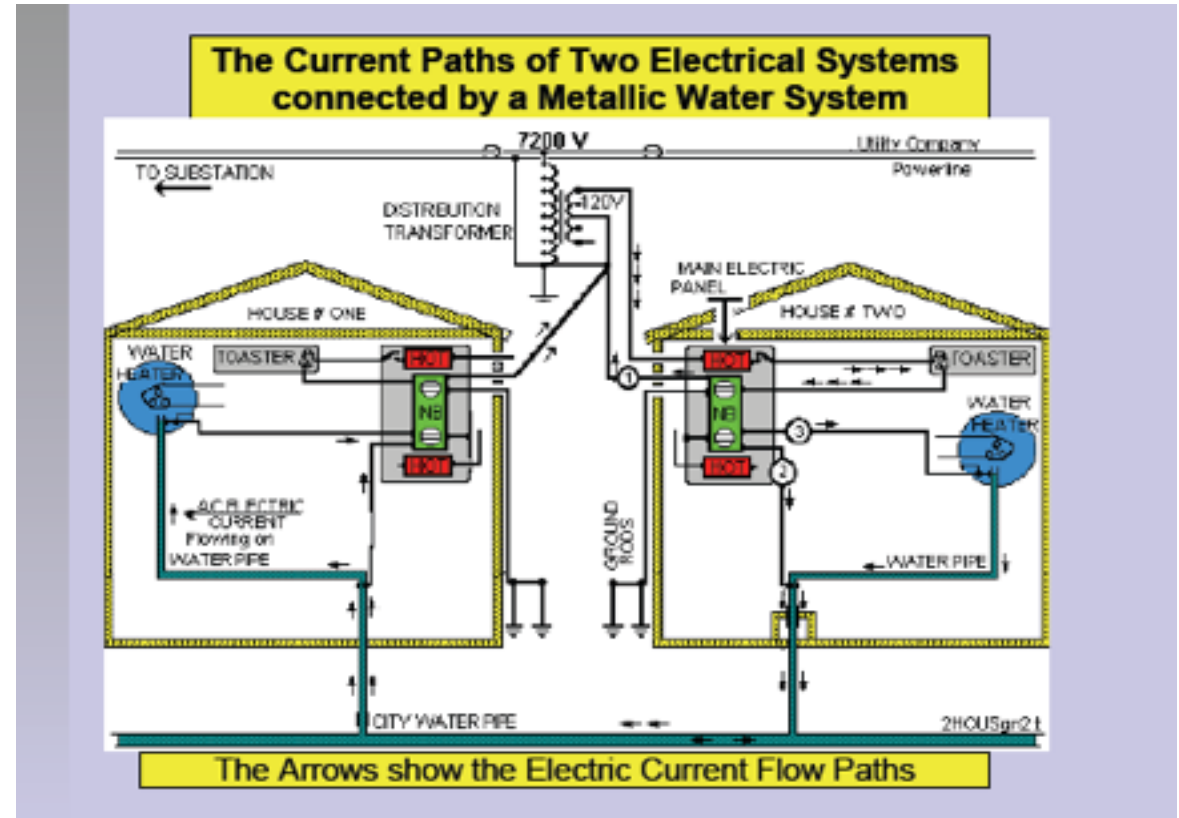
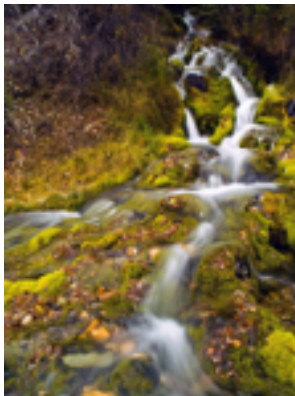


Courtesy Spark Burmaster, EE, BBEC, EMRS

Oram Miller, BBEC, EMRS

Sources of AC Magnetic Field Exposure

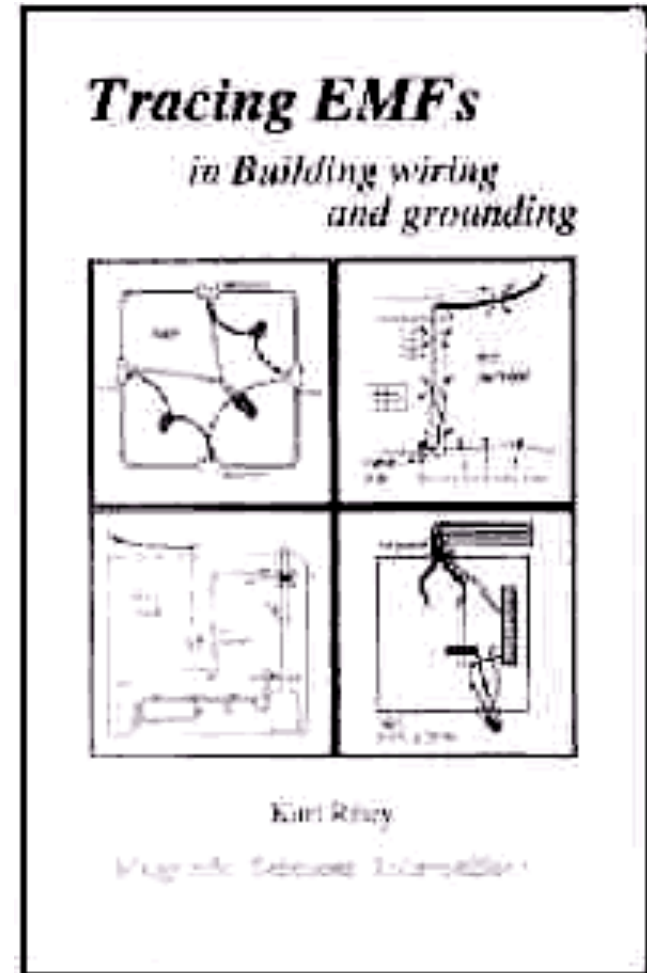
- ▶ Electricity takes *all* available paths
- ▶ Not only the path of least resistance
- ▶ Similar to a stream taking all available paths to flow down a mountain



Courtesy Spark Burmaster, EE, BBEC, EMRS

Sources of AC Magnetic Field Exposure

- ▶ Tracing EMFs in Building Wiring and Grounding
- ▶ Karl Riley, 3rd Edition
- ▶ Available from www.lessemf.com
- ▶ Provided by Southern California Edison EMF Consultants to customers



Service Drop Configurations



Poor Meter and Panel Location:
Next to Occupied Space.
Worse Case: Sleeping Area.



Better: Meter &
Panel on Garage
Far Wall.



Best: Meter & First Panel
Away from House.
Central Point
for Feeds to Well
and Out Buildings.

16

Courtesy Spark Burmaster, EE, BBEC

Oram Miller, BBEC, EMRS

Reduce Magnetic Field Exposure

- ▶ Do not live near high tension power lines
- ▶ Do not sleep within 4 feet of electric meter (analog or digital) or breaker panel
- ▶ Do not sleep or sit on other side of refrigerator or TV
- ▶ Move transformers and uninterrupted power supply at computer work station 2-3 feet away from your feet and legs
- ▶ Current on return path needs to equal current on outgoing path (neutral must stay in same conduit or “raceway” as hot conductor)
- ▶ Current should only flow on intended paths (insulated wires), not on grounding paths (avoid “objectionable” current on ground)

- M. Spark Burmaster, EE, BBEC, and NEC

Reduce Magnetic Field Exposure

- ▶ Transformer for halogen track lighting away from beds or sitting areas
- ▶ Do not sleep over fluorescent light fixtures or fan in ceiling of room underneath
- ▶ No motorized or electric beds without plugging into power strip with on/off switch



Summary of EMFs Basics

- ▶ Flow of current produces magnetic fields
- ▶ Pressure of voltage produces electric fields
- ▶ EMFs found at various frequencies
- ▶ Meters and instruments used as detectors
- ▶ Can cause health problems
- ▶ Design home and office to avoid EMFs in first place

Summary of Steps to Reduce EMFs Magnetic Fields

- ▶ Keep current on intended paths: insulated hot and neutral conductors within circuits
- ▶ Keep current off grounding paths: water pipes, TV cable sheathing
- ▶ Check for wiring errors prior to occupancy
- ▶ Avoid proximity to point sources: breaker panel, refrigerator, transformer, digital clock at front of stove
- ▶ Do not build on property near power lines

Summary of Steps to Reduce EMFs Electric Fields

- ▶ Metal clad circuits (Flex or EMT) in and around bedrooms
- ▶ Shut off switch for outlets within 6-8 feet of bed
- ▶ With Romex circuits, use remote shut off switch for circuits
- ▶ Rewire lamps with shielded cord (MuCord)
- ▶ Move unshielded cords away from you at computer desk
- ▶ Use three-pronged, grounded AC power cords for laptops

Summary of Steps to Reduce EMFs Radio Frequencies

- ▶ Reduce Use
- ▶ Increase distance
- ▶ Favor hardwired connections for Internet, telephone, media, security system, speaker, thermostat, intercom, & baby monitor connections
- ▶ Opt out of smart meters or use shielding
- ▶ Half mile to three-quarters of mile from most cell towers
- ▶ Incorporate shielding when necessary

Summary of Steps to Reduce EMFs Dirty Electricity

- ▶ Replace CFLs with traditional light bulbs or LED bulbs
- ▶ Prefer straight on/off switches to dimmers
- ▶ Central control system dimmers (Lutron, Crestron) more clean than off-the-shelf dimmers
- ▶ Avoid ECM variable speed HVAC motors
- ▶ Replace smart utility meter with analog meter

Create Healthy Homes

Oram Miller, BBEC, EMRS

West Los Angeles, California

310.720.7686

www.createhealthyhomes.com