

The Building Biology Approach to EMF Hazards and Solutions

March 2, 2015

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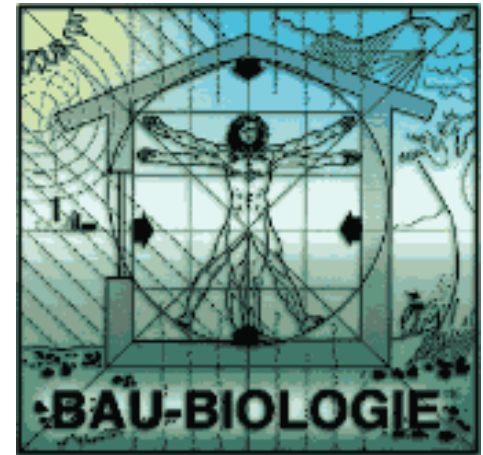
West Los Angeles, California

310-720-7686

www.createhealthyhomes.com

What is Building Biology®?

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



In Memoriam



Architect Helmut Ziehe

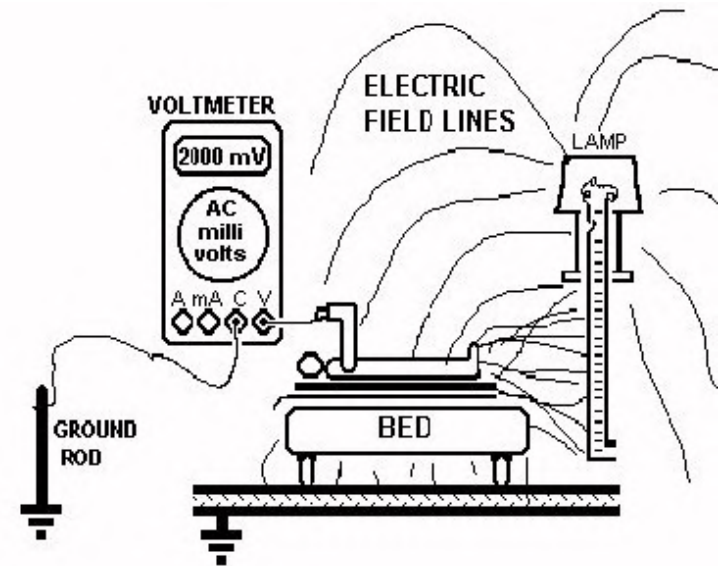
Founder, International Institute for Bau-
biology and Ecology (IBE)

Passed away January 2013

-2013

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 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
- ▶ Always have a balance between sources of EMF toxicity versus diet, heredity, stress levels, healing modalities

Building-Related Causes of Ill Health

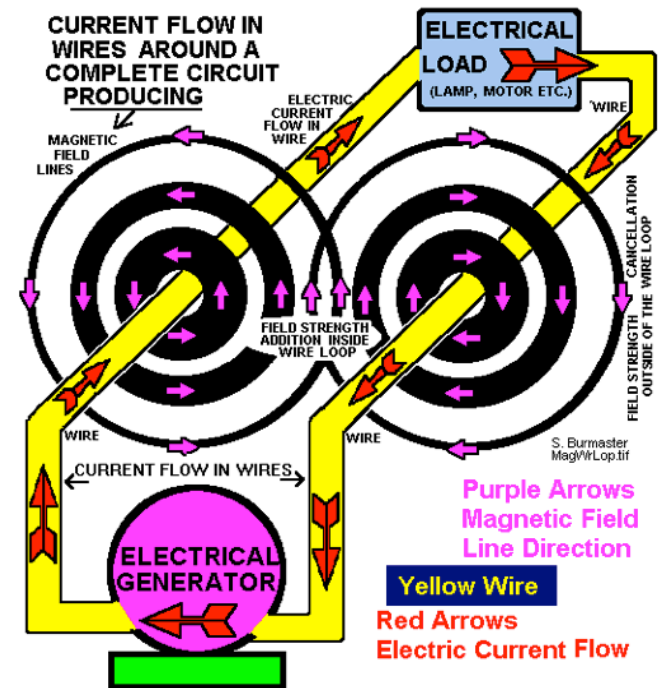
Among the General Public:

- ▶ 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

Building-Related Causes of Ill Health

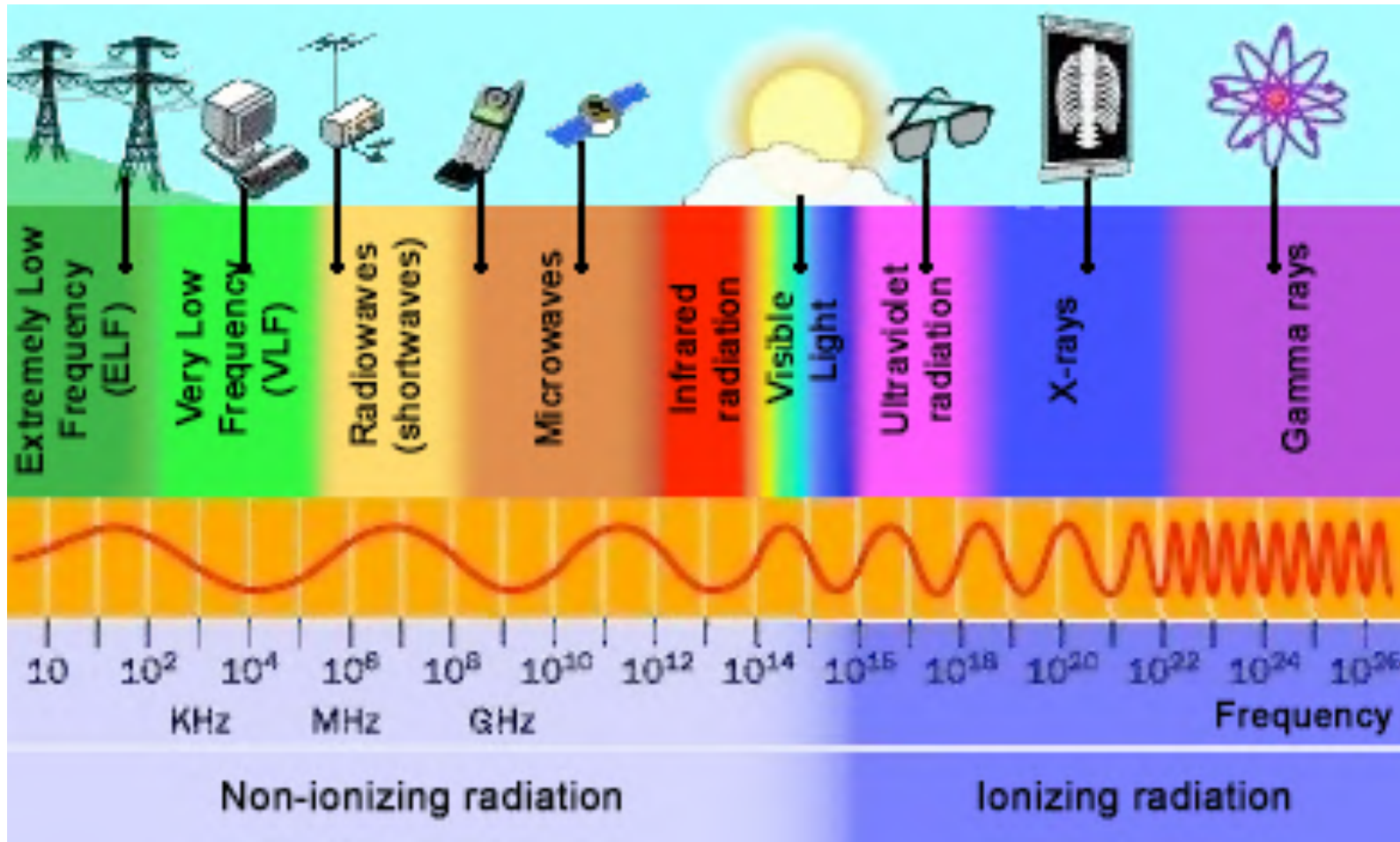
Four types of “EMFs”:

1. AC Electric Fields
2. AC Magnetic Fields
3. Radio Frequency (RF) Fields
4. “Dirty Electricity” from harmonic frequencies



Courtesy Spark Burmaster, EE, BBEC

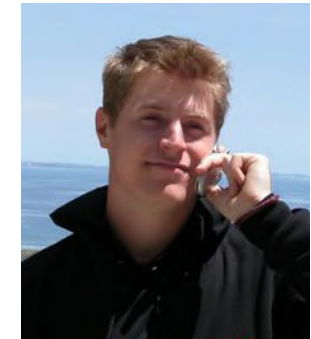
Electro-Magnetic Spectrum



www.astrosurf.com

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



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

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 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-ionising 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

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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.

 5K  578  3  11  5K  Email



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Mobile Phones

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Education News »



“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

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

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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.

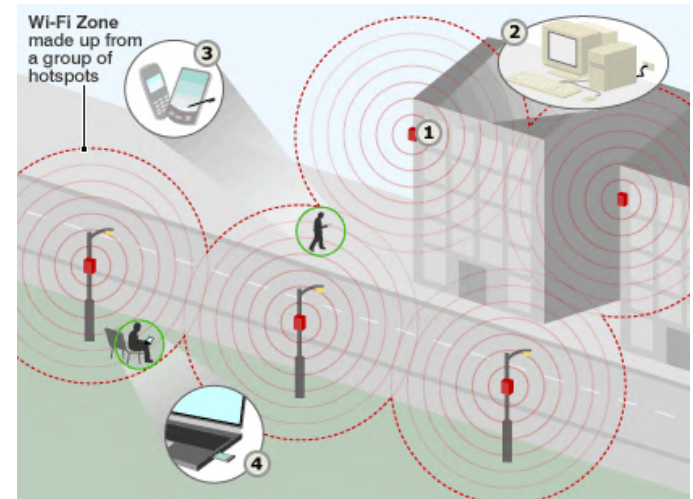
French Government Restricts Wi-Fi

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)

Radio Frequency Field Exposure

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



Sources of Radio Frequency Field Exposure

- ▶ Radio and TV broadcast towers
- ▶ Cell phone antennas
- ▶ City-wide Wi-Fi
- ▶ Wi-Fi routers in neighbors' homes and businesses



Sources of Radio Frequency Field Exposure

- ▶ 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



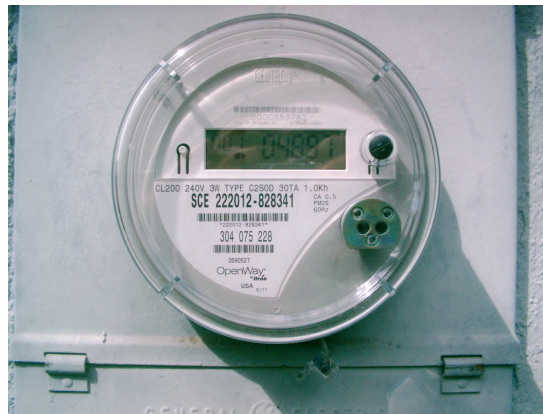
photographersdirect.com

Sources of Radio Frequency Field Exposure

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



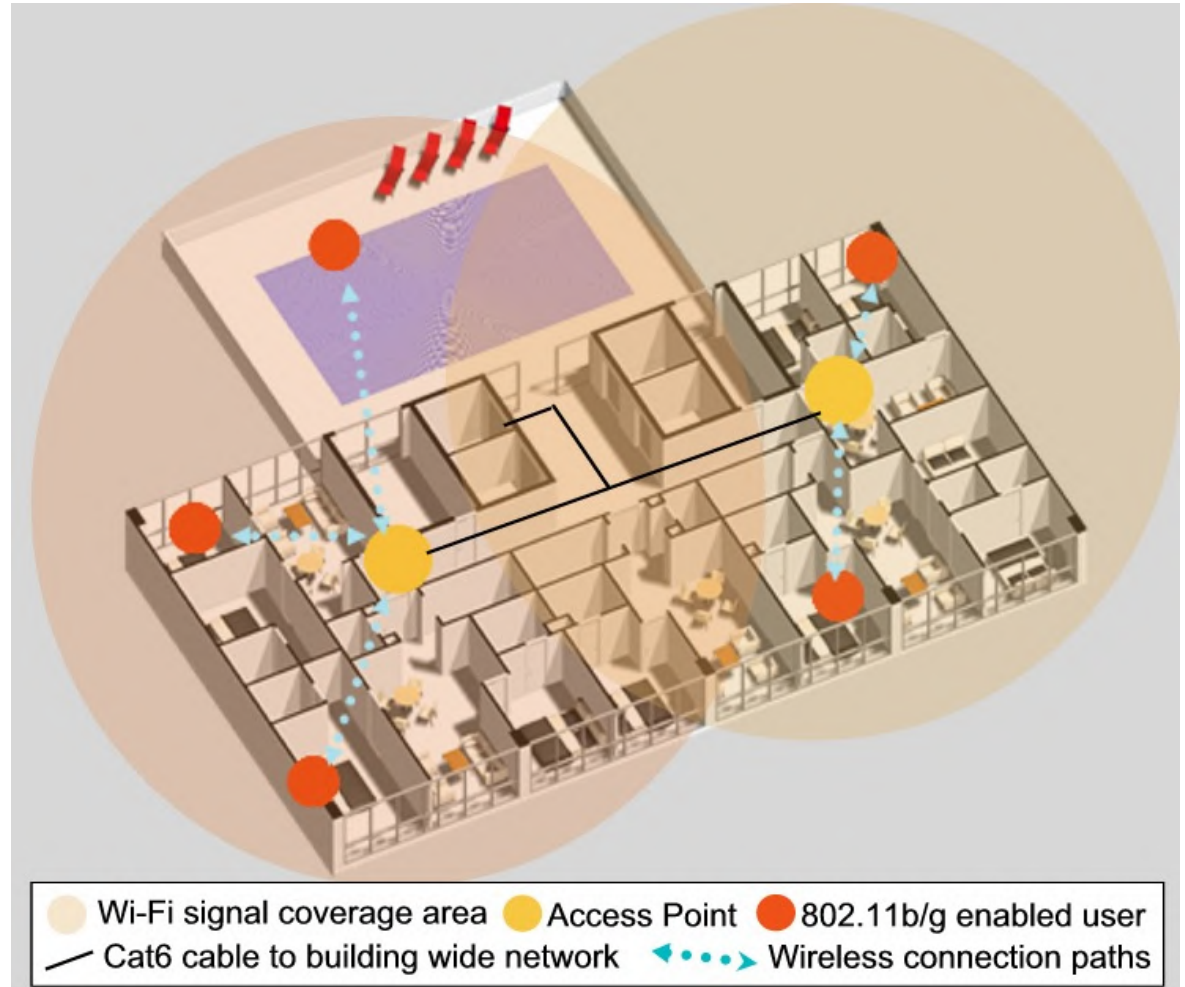
www.nickolexie.en.busytrade.com



en.wikipedia.org

Sources of Radio Frequency Field Exposure

Exposure from Wi-Fi router “nodes”



Sources of Dirty Electricity Exposure

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

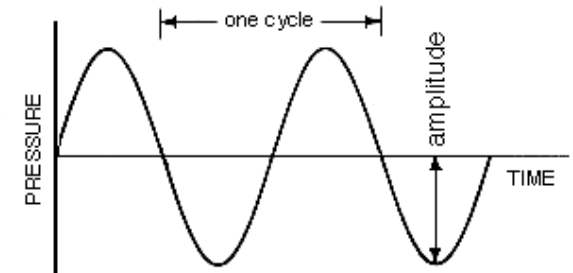


www.conrad.com

Radio Frequency Field Exposure

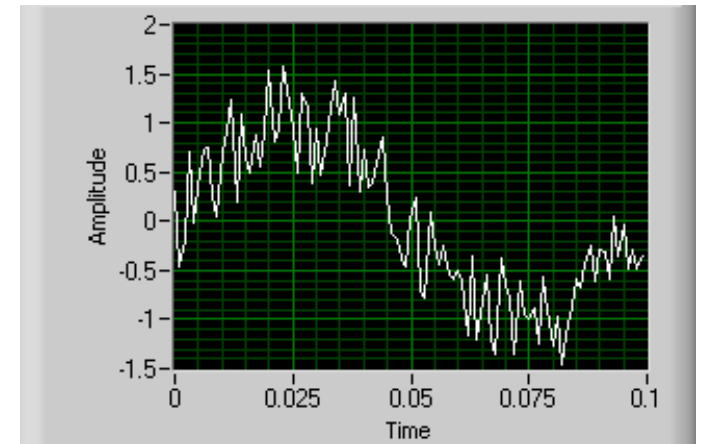
Harm comes from:

- ▶ 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

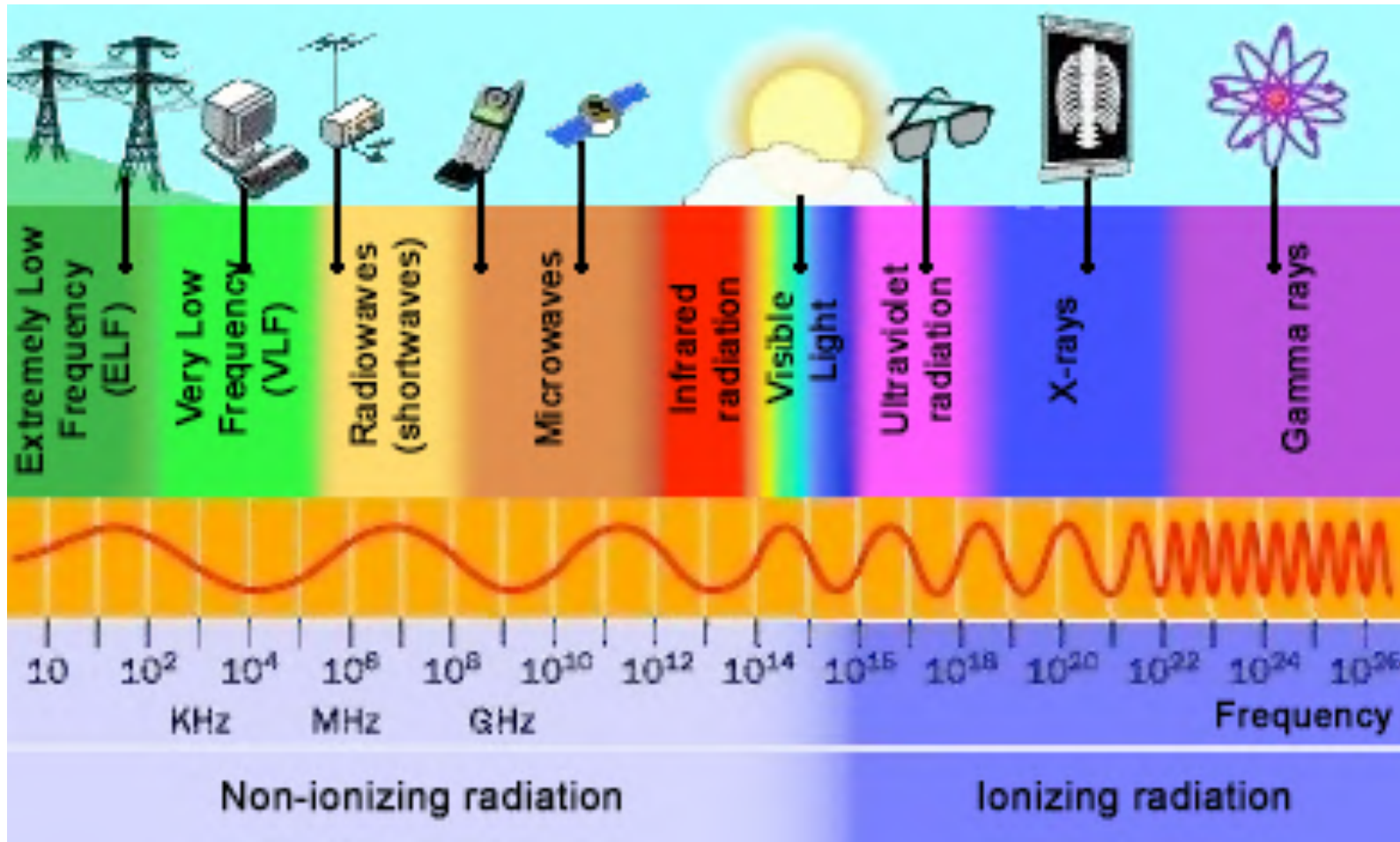
Smooth Analog Signals –
Well Tolerated



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

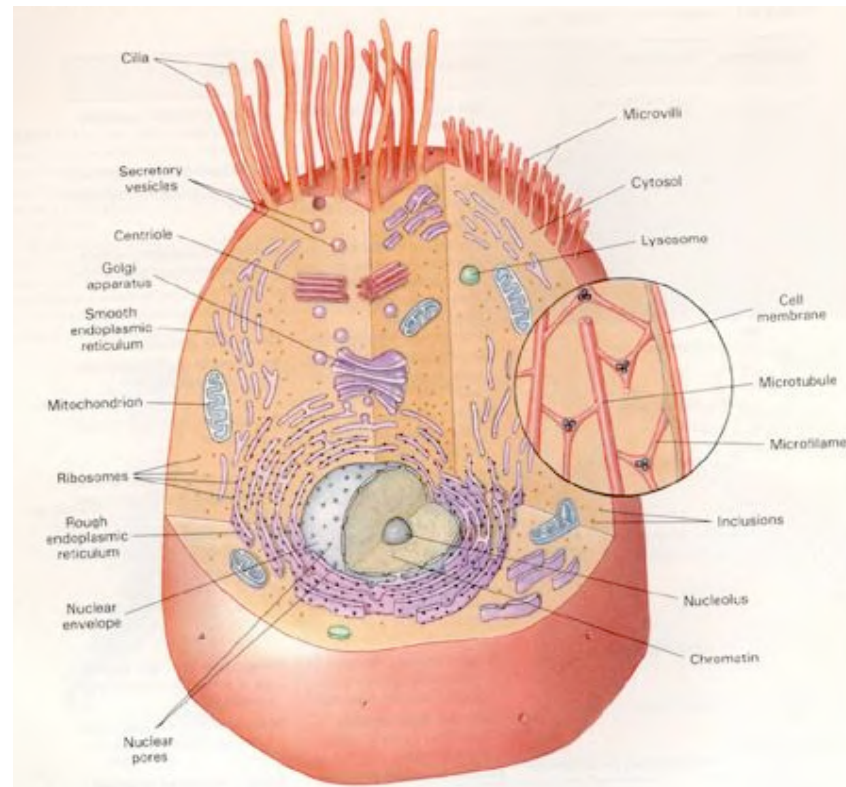
No safe exposure limits to effects of information carrying radio waves

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	--	--	1.0	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/cm ²	10,000,000 μW/m ²
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

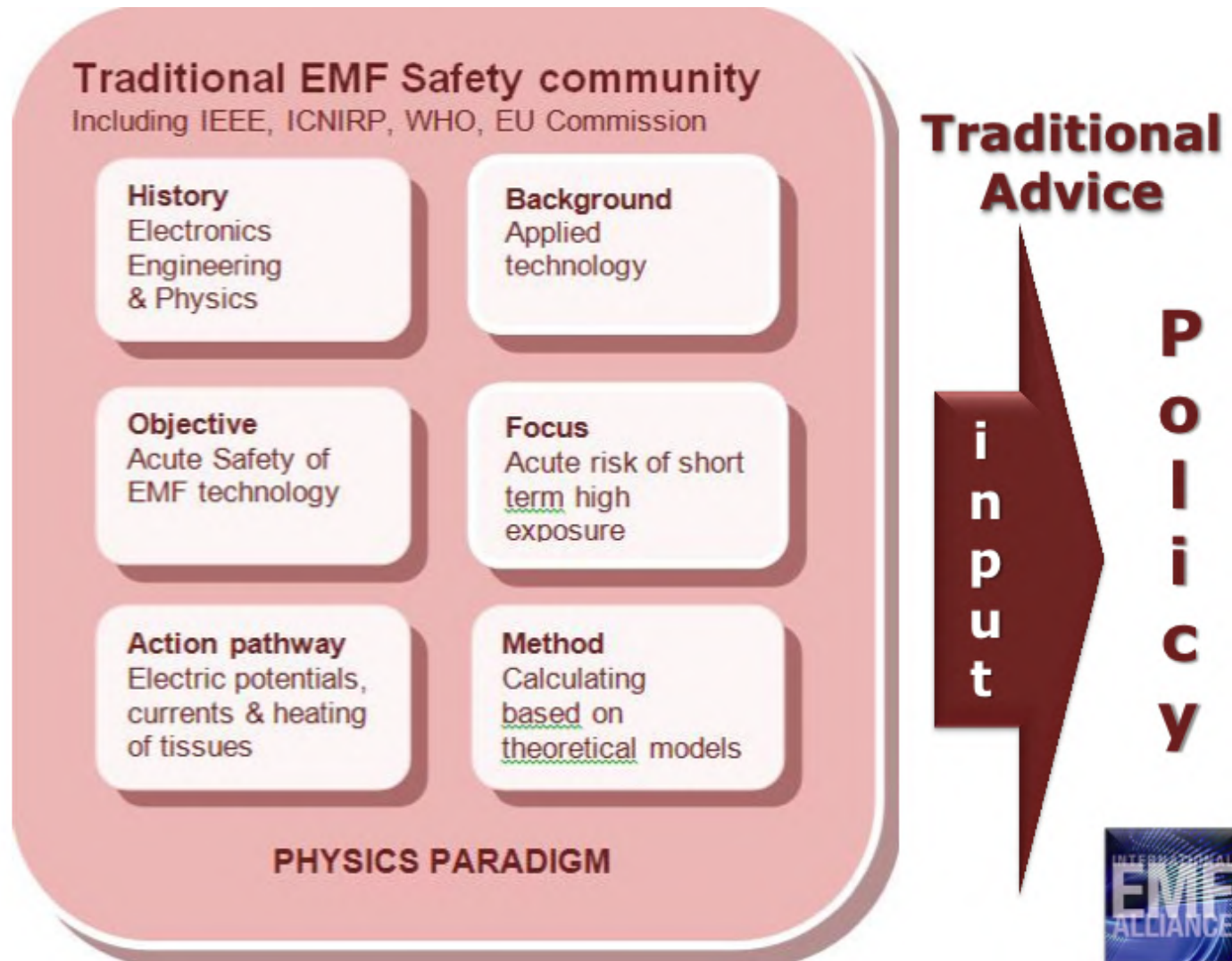
Building Biology Safe Exposure Guidelines for RF

Building Biology Evaluation Guidelines for Sleeping Areas,
SBM-2008, Page 1

Radiofrequency Radiation (High Frequency, Electromagnetic Waves)

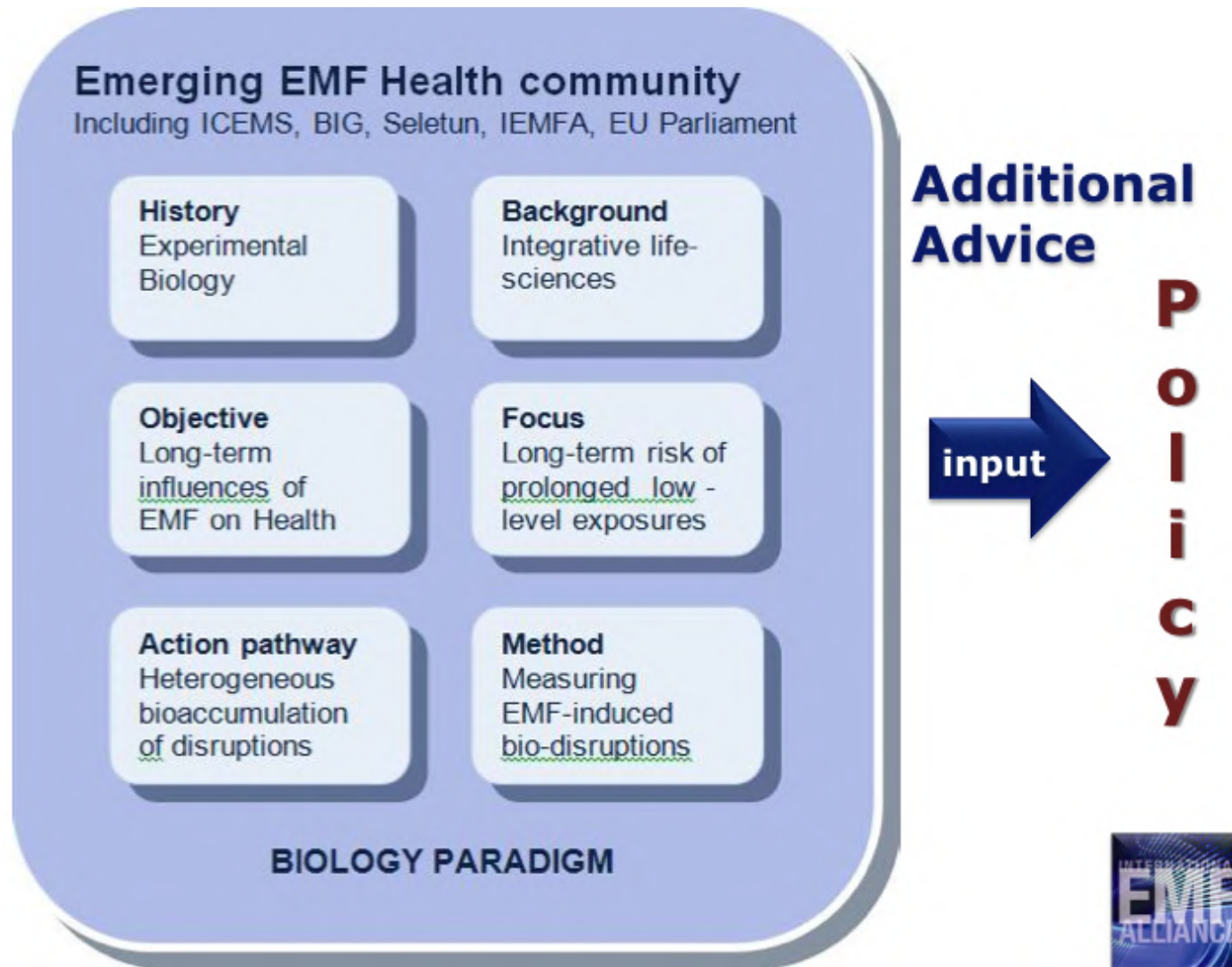
	No Concern	Slight Concern	Severe Concern	Extreme Concern
Power Density in microWatts/meter squared ($\mu\text{W}/\text{m}^2$)	< 0.1	0.1 - 10	10 - 1,000	> 1,000

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 cause biological 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 EMF” on www.createhealthyhomes.com

The Bottom Line

If you use a cell phone, cordless phone, tablet or laptop, 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
- ▶ Prefer speakerphone and texting
- ▶ Air tube earphone for cell phones and cordless telephones
www.rfsafe.com
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 landline telephone and *use* it
- ▶ Corded telephones rather than cordless
- ▶ 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 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 \$10
- ▶ 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 LAN is not affordable, use pair of network adapters
- ▶ Netgear Powerline 200 or 500 Mbps
- ▶ Avoid models with Wi-Fi on second adapter



www.amazon.com

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
- ▶ Can still run television signals through co-axial cable using splitter

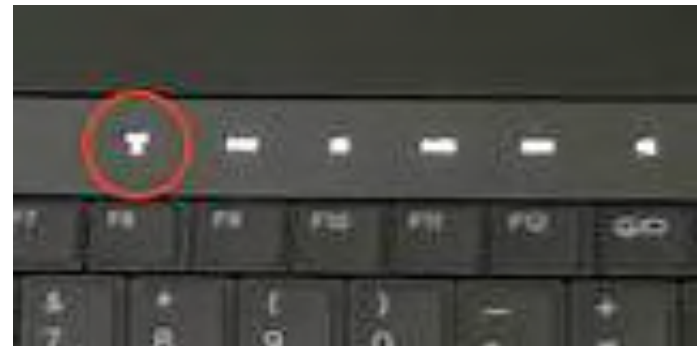


Protect Yourself from Harmful Radio Frequency Field Exposure

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



iccinfocus.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 RF



gottabemobile.com



www.amazon.com



www.amazon.com



www.amazon.com



iphonehoesjeshop.nl

Oram Miller, BBEC, EMRS

Protect Yourself from Harmful Radio Frequency Field Exposure

- ▶ Avoid Wi-Fi by providing hardwired connection to TV for streamed video for Netflix, Hulu
- ▶ Plug Ethernet cable into Roku or Apple TV device
- ▶ Automatically disables Wi-Fi on Apple TV 1 & 2
- ▶ With Apple TV 3, must disable Wi-Fi with onscreen command
- ▶ Verify with RF detector, if you have one



commons.wikimedia.org



zdnet.com

Protect Yourself from Harmful Radio Frequency Fields from Outside

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



Steelintheair.com



Longdistancecarriers.us

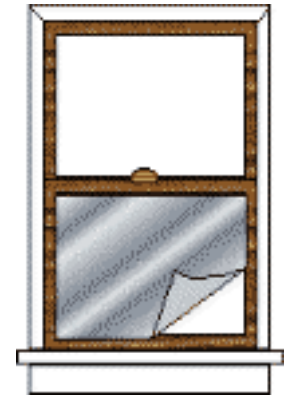
Protect Yourself from Harmful Radio Frequency Field Exposure

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

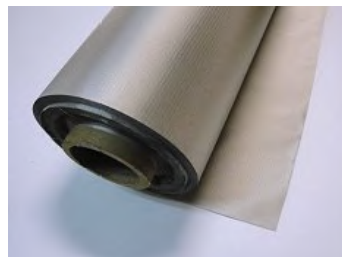
- ▶ RF reflecting paint
- ▶ Fabric, bed canopy
- ▶ Metal window screen or film on windows
- ▶ www.lessemf.com
- ▶ www.safelivingtechnologies.com



Y-shield® Paint



Scotchint® Window Film



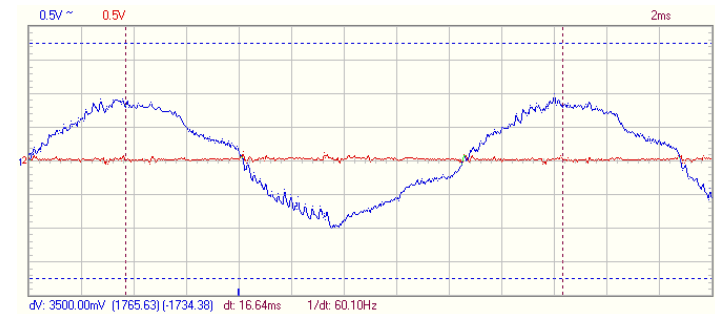
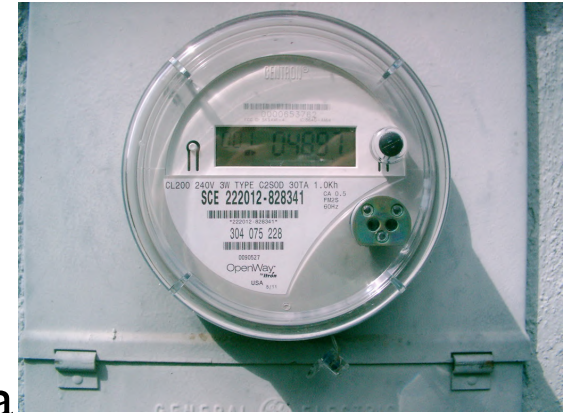
RF Shielding Materials & Fabrics



Bed Canopy

Protect Yourself from Smart Electric Meters

- ▶ Transmit data *once* per day (Southern California Edison); (twice/day for San Diego Gas & Electric)
- ▶ Emit “beacon signals” twice per minute on average to “synchronize” smart meters in mesh network
- ▶ Signal is 75-100 times less strong in Southern California than Northern California & rest of US
- ▶ Fewer signals per minute in SoCal vs NorCal
- ▶ Still, some experience health symptoms
- ▶ No evidence of “dirty power” from Itron meters in SoCal (spikes at lower right from dimmer switch)
- ▶ Opt Out programs available from PG&E, SCE & SDG&E



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 Greenwave or Stetzer Filters (repair wiring errors first)



Chips, Pendants and Home Harmonizers

- ▶ I believe they are useful
- ▶ Not supported by building biology faculty (engineers)
- ▶ No change on EMF meters
- ▶ Research does support their use:
- ▶ Rat DNA, Less rouleaux formation, Thermography
- ▶ Thousands of testimonials
- ▶ Do not use as exclusive means of protection

EMF Meters and Instruments

Magnetic Fields

- ▶ Gauss Master (single axis)
- ▶ Tri-Field Meter (triple axis)
- ▶ Tri-Field not recommended for electric or radio fields (RF)
- ▶ “Buzz Stick”



Buzz Stick



Gauss Master



Tri-Field Meter

EMF Meters and Instruments

Electric Fields

- ▶ Body Voltage Meter
- ▶ Hand-held Meter



Body Voltage Meters



Hand-held Meter

EMF Meters and Instruments

Radio Frequency (RF) Fields

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



Cornet RF Meter



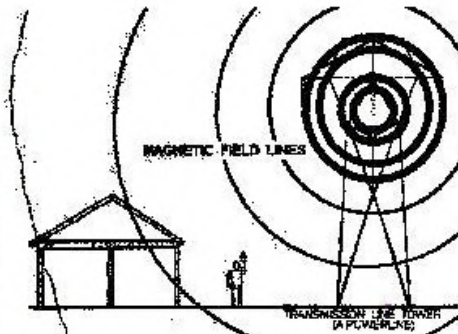
Gigahertz Solutions HF35C



3-Axis RF Meter

COMPARISON OF AC MAGNETIC AND AC ELECTRIC FIELDS

MAGNETIC FIELDS

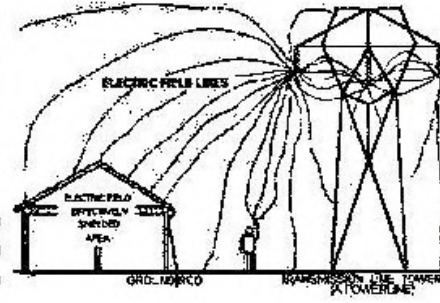


ARE THE ENERGIZATION OF THE SPACE AROUND ELECTRIC CURRENT FLOW

PRODUCED BY
ELECTRIC
CURRENT FLOW

DETECTED/ MEASURED BY:
GAUSSMETER/ AMP METER

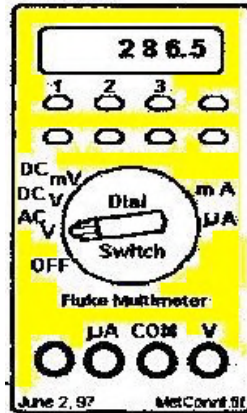
ELECTRIC FIELDS



ARE THE ENERGIZATION OF THE SPACE BETWEEN VOLTAGE DIFFERENCES

PRODUCED BY
VOLTAGE

DETECTED/ MEASURED BY:
VOLT METER



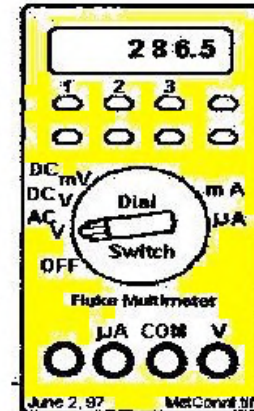
AC Magnetic Field
Sensor Coil

Set Meter Dial Switch
to AC Volts

AC Electric Current Flow
Amp Clamp On



Set Meter Dial Switch to Micro
Amps (μA) (for milliohm measurements)



AC Electric Fields
Body Voltage
Probe



Set Meter Dial Switch
to AC Volts

28-Fs

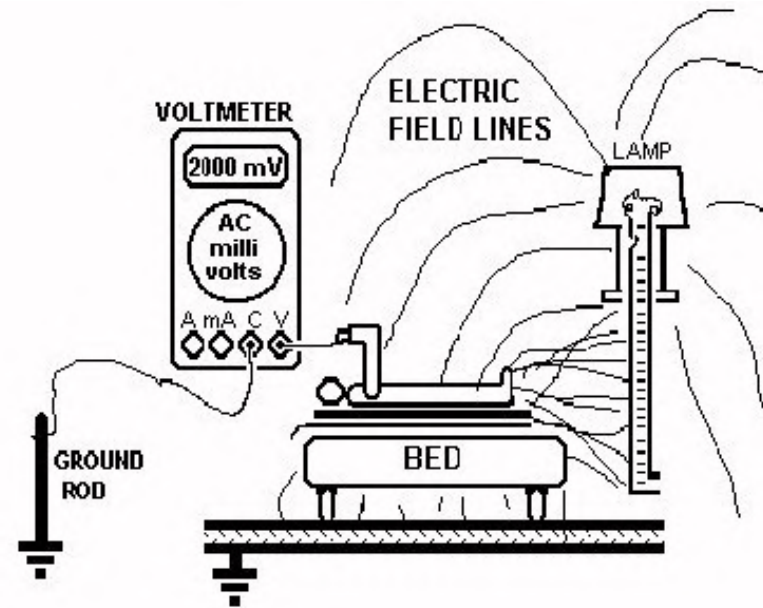


Courtesy
Spark
Burmester,
EE, BBEC

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)



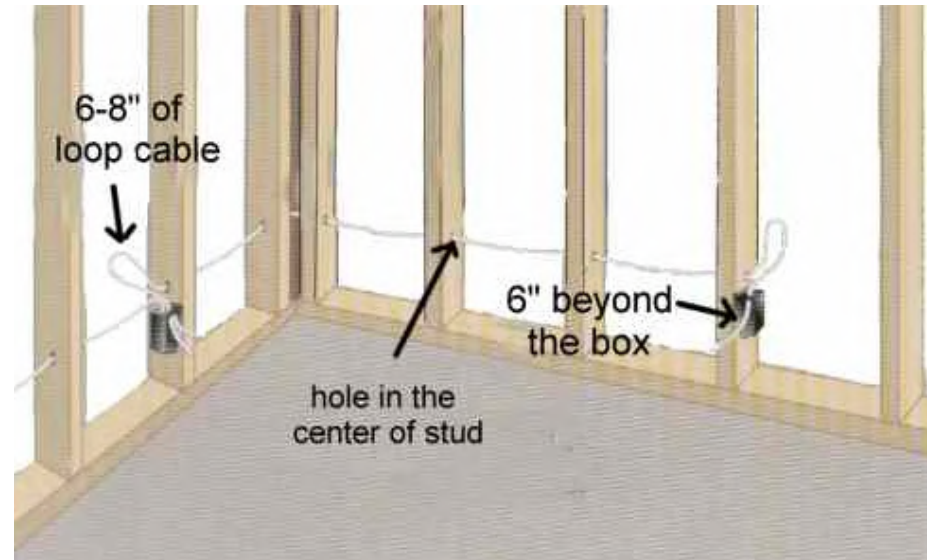
Courtesy Spark Burmaster, EE, BBEC



Oram Miller, BBEC, EMRS

AC Electric Field Basics

- ▶ AC Electric field present even if current is not flowing (e.g., lamp is off)
- ▶ Extends up to 6-8 feet from un-shielded AC power cord or plastic-jacketed wiring in wall
- ▶ Decreases with distance
- ▶ Affects people while sleeping



Unshielded Romex Wiring



Bedside Lamp Cord

www.etsy.com

Sources of AC Electric Field Exposure

Large electric field exposure from:

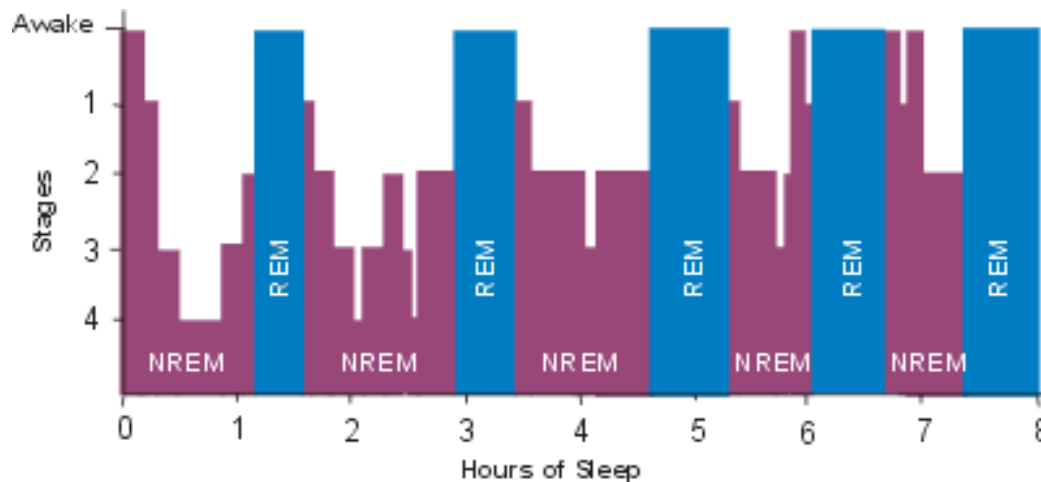
1. Electric blankets
2. Electric heating pads
3. Water bed heaters

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



Health Effects from Exposure to Electric & Magnetic Fields

- ▶ Exposure prevents deep, Stage Four Sleep
- ▶ Increase in normal nighttime production of melatonin
- ▶ Causes allergies, asthma, rashes, chronic fatigue, fibromyalgia, sleep disorders
- ▶ Also hyperactivity, depression, headaches



Sequences of states and stages of sleep on a typical night

Oram Miller, BBEC, EMRS

Improvements With Reduction of Electric and Magnetic Fields

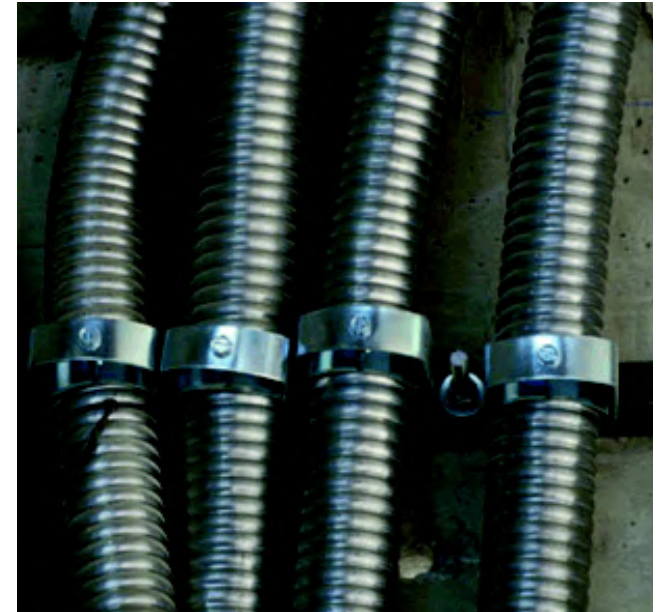
- ▶ Deeper levels of Stage Four sleep
- ▶ Increase in normal night time melatonin production
- ▶ Results in:
 1. Increased vitality and alertness
 2. Reduction of muscle pain and stiff joints
 3. Increase in flexibility and range of motion
 4. Reduction of fatigue, allergies, depression, cancer
 5. Greater 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

- ▶ Use flexible steel MC (metal clad) or rigid (EMT) cable for all circuits (new & remodel)
- ▶ Create an electrically clean sleeping environment
- ▶ Within 6-8 feet around, above, and below each bed
- ▶ Same for day use area (desk, easy chair)
- ▶ Shielded AC power cords



Flexible Metal Clad Wiring

Reduce Electric Field Exposure

- ▶ Unplug all AC power cords 6-8 feet from bed
- ▶ Plug-in switches, shielded power strip
- ▶ Re-wire lamp with Mu-Cord (LessEMF.com)
- ▶ Demand Switches
- ▶ Avoid electric blankets, electric heating pads, water bed heaters
- ▶ Use battery-operated clock and flashlight
- ▶ Have the home professionally evaluated for EMFs



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, then add earthing pad



radiantlifecatalog.com

Reduce Electric Field Exposure

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 grounded replacement AC power cord from www.prontocharger.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:



Three-pronged plug:



Reduce Electric Field Exposure

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

Two-pronged plug:



laptopbatterylife.com

Three-pronged plug:



mactechgear.com

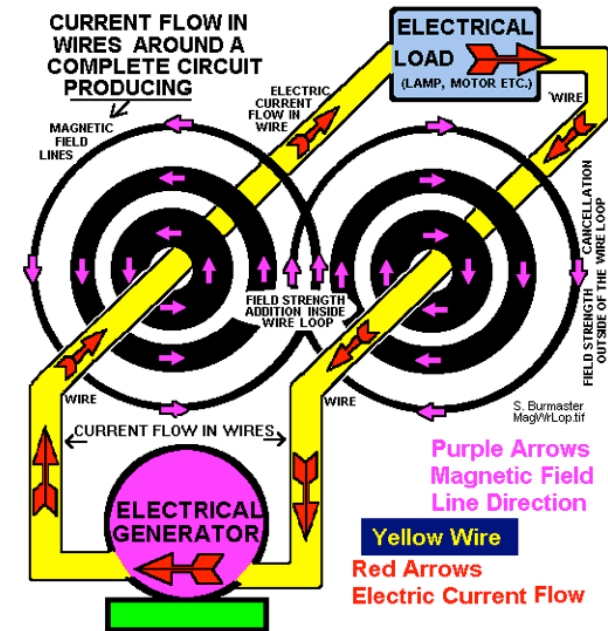


shop.accessory4you.com

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)

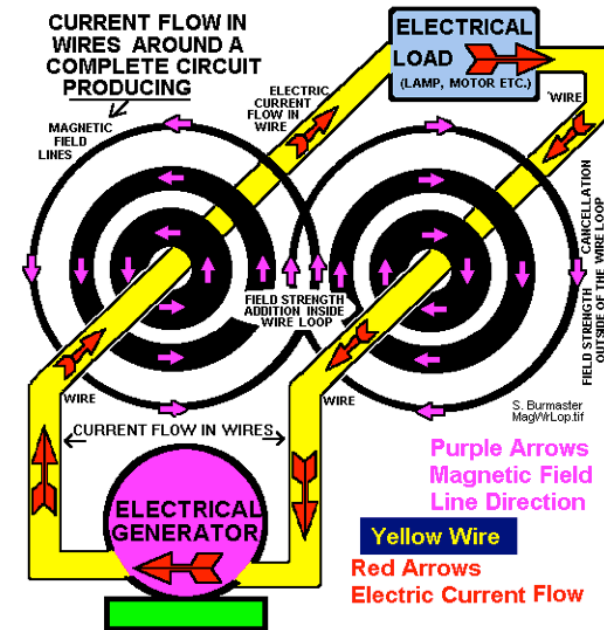


Courtesy Spark Burmaster, EE, BBEC

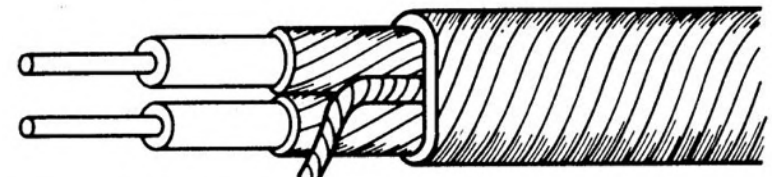


AC Magnetic Field Basics

- ▶ Decreases with distance from the source
- ▶ Extends only 2-4 feet from typical point sources
- ▶ Can extend 6-10 feet from current on grounding system
- ▶ Occurs when wires are separated (hot from neutral)
- ▶ Fields are cancelled when wires run together



Courtesy Spark Burmaster, EE, BBEC



AC Magnetic Field Basics

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



Mu Metal

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



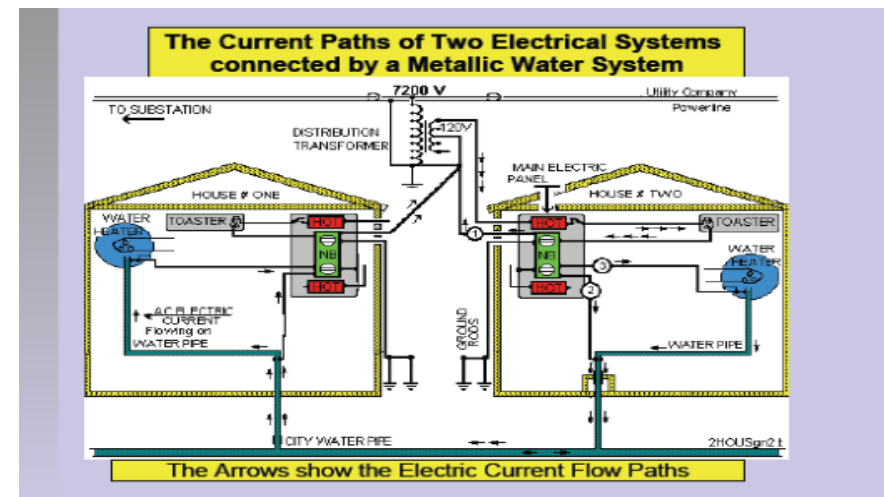
Sources of AC Magnetic Field Exposure

Major sources in homes
(continued):

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



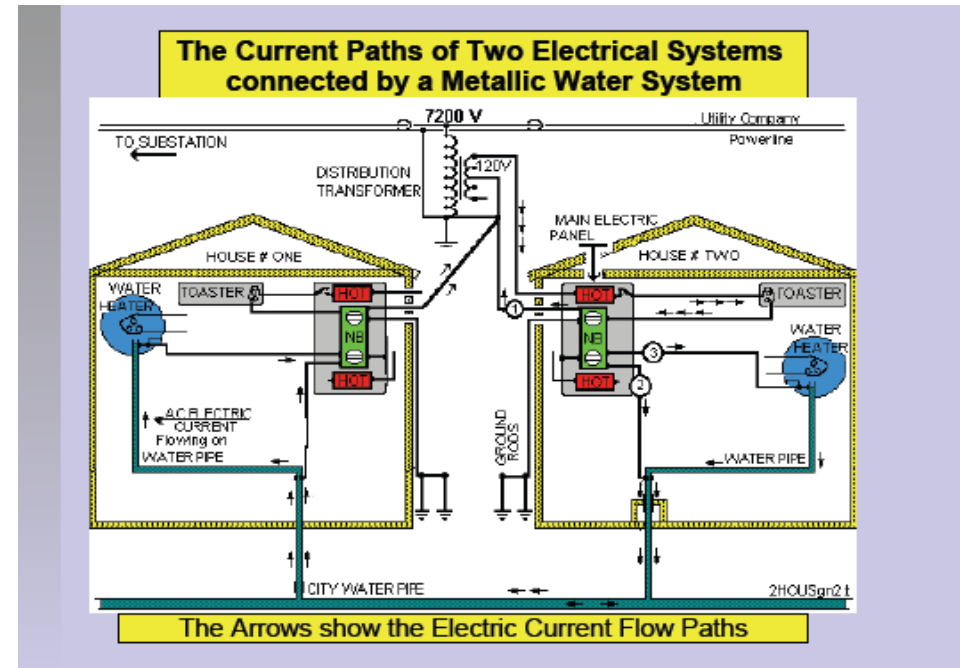
4. Current on grounding system. Enters from neighbor's homes on incoming water pipes (also on cable TV line – parallel paths)



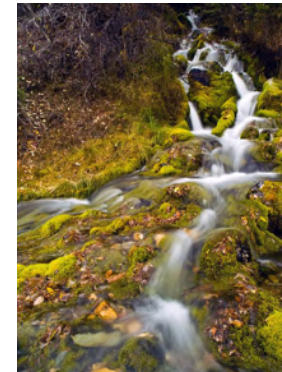
Courtesy Spark Burmaster, EE, BBEC

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



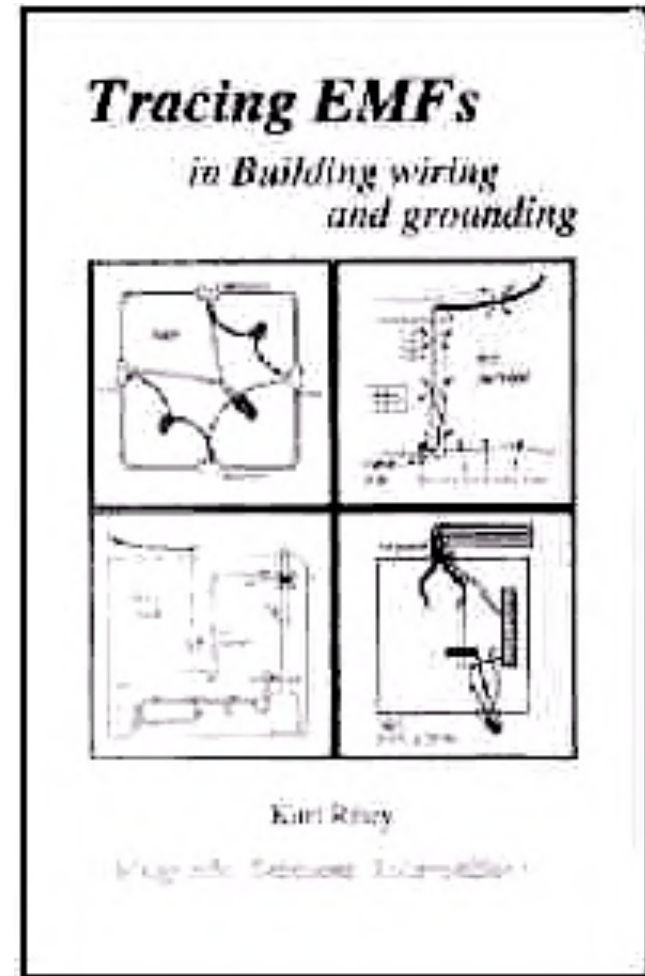
Courtesy Spark Burmaster, EE, BBEC



Oram Miller, 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 near electric meter or breaker panel
- ▶ Do not sleep or sit on other side of refrigerator or TV
- ▶ 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
- ▶ No motorized or electric beds without kill switch



Halogen Track Lighting

Summary for Architects

- ▶ Favor metal-clad circuits
- ▶ Provide kill switch for outlets near beds
- ▶ Avoid proximity to point source magnetic fields (breaker panel, refrigerator)
- ▶ Check for wiring errors prior to occupancy
- ▶ Avoid current on grounding paths
- ▶ Do not build on property near power lines

Summary for Architects

- ▶ Avoid front placement of digital clock and controls on cooktop units
- ▶ No induction cooktop units
- ▶ Place refrigerator on outside wall of kitchen
- ▶ Do not place ceiling light transformers under bedrooms
- ▶ Avoid current on grounding paths

Summary for Architects

- ▶ Avoid UFER grounds
- ▶ Best to ground to rebar encased in cement 10 feet from foundation
- ▶ Main service disconnect ideally off building
- ▶ Follow code—four wire service to all buildings
- ▶ Wire main panel at each building as sub panel (NEC code)

Summary for Architects

- ▶ Favor hardwired connections for all telephone, Internet, media, speaker, security, monitoring and thermostat services
- ▶ Place Wi-Fi access points as far from sleeping and day and evening use areas as possible, and provide a shut-off switch
- ▶ Favor hardwired central control systems rather than wireless exclusively
- ▶ Prefer “clean” dimmers; avoid ECM variable speed FAU motors

Create Healthy Homes

Oram Miller, BBEC, EMRS

West Los Angeles, California

310.720.7686

www.createhealthyhomes.com