Electromagnetic Fields: A Modern Health Hazard?

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www.createhealthyhomes.com

Source of this Knowledge: Building Biology® Profession

- We focus upon relationship between buildings and human health
- Founded in Germany in 1970s
- Brought to North America in 1987 by architect, Helmut Ziehe
- Founded Building Biology Institute[®] (BBI),
 Clearwater, Florida

www.buildingbiologyinstitute.org

Approximately 100 Certified Building Biology[®]
 Environmental Consultants (BBECs) and
 Electromagnetic Radiation Specialists (EMRSs)
 in U.S.A. and Canada





Goals of Building Biology®

- Find and reduce sources of toxicity at home, school or office – Air Quality, EMFs, Outgassing of Building Materials
- Strengthen your tolerance to toxic influences inside and outside home
- Reduce exposure to household toxins and create an EMF-free
 sleeping, living, learning and work
 environment



Courtesy Spark Burmaster, EE, BBEC, EMRS

Building-Related Causes of III Health

Building Biologists work with two groups:

- 50-60 % of clients are electrically hypersensitive (EHS)
- Two thirds of EHS clients are symptomatic
- Other 40-50% of overall clients are not sensitive nor symptomatic, just health conscious
- We see interaction between sources of EMF toxicity in environment and diet, heredity, stress levels and previous EMF, mold and/or chemical exposure

Building-Related Causes of III Health

Among the General Public:

- Only 3-5% are electrically hypersensitive (EHS)
- Yet, up to one-third are symptomatic from chronic use of wireless devices held close to head and body
- Everyone has damage from RF exposure at cellular level
- Yet, two-thirds of population can repair cellular damage at night and do not become symptomatic
- Therefore, your risk ratio for developing symptoms from EMFs is presently one out of three
- That number is expected to rise because EHS is increasing

Four types of EMFs

- I. AC **Magnetic Fields** from house wiring and power lines (at 60 Hz)
- 2. AC **Electric Fields** from house wiring and power lines (at 60 Hz)
- 3. Radio Frequency (RF) Fields (600-3,700 MHz; 28 & 39 GHz)
- 4. Dirty Electricity is at higher frequencies (120 Hz-100,000 Hz)
 — meaning, Magnetic and Electric fields *above* 60 Hz



Courtesy Spark Burmaster, EE, BBEC, EMRS

Sources of EMFs

- Nighttime EMF sources vs. daytime sources
- Outdoor EMF sources vs. indoor sources
- Nighttime EMFs: AC electric fields and RF
- Daytime EMFs: AC magnetic fields from wiring errors and current on grounding paths, electric fields from ungrounded laptops, RF, dirty electricity
- Outdoor EMFs: power line magnetic fields and RF (cell towers, smart meters, neighbor's WiFi)

EMF Assumptions vs. Our Understanding

Four assumptions within EMF Community about EMFs:

- I. 5G cell towers & smart meters outdoor RF sources
- 2. Dirty electricity
- 3. Chips, pendants & home harmonizers
- 4. Earthing mats
- Our profession recognizes all four and adds:
 - I. Magnetic fields
 - 2. Electric fields
 - 3. Indoor RF sources

The Problem

Here are components that make dealing particularly with RF such a difficult problem, as I see it:

- RF fields created by wireless devices and technologies are invisible, silent and odorless, unlike cigarette smoke
- Most people want convenience of portability and love ability to instantly connect with information and other people
- The cell/wireless industry makes a lot of money
- Industry controls flow of information and regulation of health effects on federal, state and often, local level
- Most people do not feel harmful effects of RF

EMF Characteristics

- Again, all EMFs are silent, invisible and odorless
- You don't know they are there unless you are Electrically Hypersensitive (EHS) and feel them
- Or, you have an EMF/RF meter to measure them, preferably a meter with sound
- EMF/RF meters make the invisible visible and the inaudible audible

Electric & Magnetic Field (EMF) Exposure

- AC EMFs created by alternation of polarity (positive to negative to positive...) of AC electricity on electric power lines, circuits and power cords — 60 times per second (60 Hz)
- "M" of EMF is *magnetic* field component
- "E" of EMF is *electric* field component
- Both EMFs emit off outdoor power lines and indoor circuits and power cords at right angles to each other
- Magnetic and electric fields enter our living space and affect our health



Electric & Magnetic Field (EMF) Exposure

- Electric and magnetic fields coupled in far field
- Far field defined as 3 or more wavelengths from source
- Within near field, electric and magnetic fields uncoupled
- Wavelength at 60 Hz is 3,100 miles
- We are always in near field
- Both components of EMFs from house wiring must be measured separately
- Can have electric fields without magnetic fields
- Electric fields often missed "unknown EMF"



ixquick-proxy.com

Electro-Magnetic Spectrum



www.astrosurf.com

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

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

Power Density (Microwatts/centime	eter2 - uW/cm2)	Reference
0.5 uW/cm2	Significant degeneration of seminiferous epithelium in mice at 2.45 GHz, 30-40 min.	Saunders, 1981
0.5 - 1.0 uW/cm2	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/cm2	RFR induced pathological leakage of the blood-brain barrier	Persson, 1997
1.0 uW/cm2	RFR caused significant effect on immune function in mice	Fesenko, 1999
1.0 uW/cm2	RFR affected function of the immune system	Novoselova, 1999
1.0 uW/cm2	Short-term (50 min) exposure in electrosensitive patients, caused loss of well-being after GSM and especially UMTS cell phone radiation exposure	Eltiti, 2007
1.3 - 5.7 uW/cm2	RFR associated with a doubling of leukemia in adults	Dolk, 1997
1.25 uW/cm2	RFR exposure affected kidney development in rats (in-utero exposure)	Pyrpasopoulou, 2004
1.5 uW/cm2	RFR reduced memory function in rats	Nittby, 2007
2 uW/cm2	RFR induced double-strand DNA damage in rat brain cells	Kesari, 2008
2.5 uW/cm2	RFR affected calcium concentrations in heart muscle cells	Wolke, 1996
2 - 4 uW/cm2	Altered cell membranes; acetycholine-induced ion channel disruption	D'Inzeo, 1988
4 uW/cm2	RFR caused changes in hippocampus (brain memory and learning)	Tattersall, 2001
4 - 15 uW/cm2	Memory impairment, slowed motor skills and retarded learning in children	Chiang, 1989
5 uW/cm2	RFR caused drop in NK lymphocytes (immune function decreased)	Boscolo, 2001
5.25 uW/cm2	20 minutes of RFR at cell tower frequencies induced cell stress response	Kwee, 2001
5 - 10 uW/cm2	RFR caused impaired nervous system activity	Dumansky, 1974
6 uW/cm2	RFR induced DNA damage in cells	Phillips, 1998

www.bioinitiative.org

Additional EMF Organizations



NTERNATIONAL COMMISSION ON THE BIOLOGICAL EFFECTS OF ELECTROMAGNETIC FIELDS

International Commission on the Biological Effects of Electromagnetic Fields

"A multi-disciplinary consortium of scientists, doctors and related professional who...have been involved with research related to the biological and health effects of electromagnetic frequencies up to and including 300 GHz."

www.icbe-emf.org

Additional EMF Organizations



Environmental Health Trust

"A scientific think tank with a mission to safeguard human health and the environment by empowering people with state-of-the-art information."

www.ehtrust.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
- Yet U.S. is promoting Wi-Fi for everything
- Fifth Generation cell technology (5G) abounds
- 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 unit is "always on"
- Additional wireless devices
- All emit continuous or intermittent pulsed digital frequencies in standby mode
- Similar to ashtrays with burning lit cigarettes, filling room with smoke



velocidaddeinternet.com



china-telecommunications.com



photographersdirect.com

Sources of Radio Frequency Field Exposure Inside Home

- Cell phones, tablets
- Laptops, desktop computers
- TVs, streaming video players
- Printers
- Smart thermostats
- Doorbells
- Security system
- "Internet of Things" (IoT)





betterteam.com

businessinsider.com



cnet.com



Idproducts.com



ring.com



treehugger.com

Sources of Radio Frequency Field Exposure Inside Home

Wireless Access

Point (WAP)

"nodes"

Mesh networks



EMF Meters and Instruments Radio Frequency (RF) Fields

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

PERCENT	588
	IFIELD® meter model TF2
Sandard Marke El Made in	And Alexants Weighter Mag (Elec R A www.thield.com







Safe & Sound Pro II



Safe & Sound Classic II

Tri-Field TF2

Cornet RF Meter

Gigahertz Solutions HF35C

Sources of Radio Frequency Field Exposure Outdoors

- Cell phone antennas, 4G
 LTE and 5G in both macro/
 legacy antennas and small
 cell antennas
- Smart Utility Meters
- Radio and TV broadcast towers
- Wi-Fi routers in neighbor's 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



<u>www.sfu.ca</u> Smooth Analog Signals – Better Tolerated



Pulsed Digital Signals – Not Well Tolerated

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
- For 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

FCC Versus the Rest of the World

- FCC's safe exposure guidelines for cell phones listed at 1.0 milliWatts/centimeter squared (mW/cm²)
- Yet that translates to 10 million microWatts/meter squared (µW/m²), the units used by rest of the world
- Other countries recommend lower RF safe exposure levels than the US
- Building Biology recommends RF levels one hundred thousand to one million times less than FCC (100-10 µW/m² or 0.000,1-0.000,001 mW/cm²)
- FCC's guidelines based solely on thermal effects; ignore nonthermal, 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/cm²)	Averaging Time E/2, H/2 or S (minutes)
0.3-1.34	614	1.63	-100	30
I.34-30	824/f	2.19/f	(180/f2)	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/cm²	0.1 μW/m²
0.000.000,1 mW/cm²	Ι μW/m²
0.000,001 mW/cm²	10 μW/m²
0.000,01 mW/cm²	100 μW/m²
0.000,1 mW/cm²	I,000 μW/m²
0.001 mW/cm ²	10,000 μW/m²
0.01 mW/cm ²	100,000 μW/m²
0.1 mW/cm ²	I,000,000 μW/m²
I.0 mW/cm²	10,000,000 μW/m²
10 mW/cm ²	Ι 00,000,000μW/m²
I00 mW/cm²	I,000,000,000μW/m²
1,000 mW/cm ²	10,000,000,000μW/m²
10,000 mW/cm ²	100,000,000,000μW/m²

Comparative Chart on International Safe Exposure Guidelines

1800 MHz Public Exposure Guidelines	PFD µW/m²	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)	I,000	0.6	30
Salzburg 1998 (sum GSM)	١,000	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)	I	0.02	I
Burgerforum BRD proposal, waking areas (1999)		0.02	
Burgerforum BRD proposal, sleeping areas (1999)	0.01	0.002	0.1

http://www.powerwatch.org.uk/science/intguidance.asp

Building Biology Safe Exposure Guidelines for RF

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

Radiofrequency Radiation (High Frequency, Electromagnetic Waves)

	No	Slight	Severe	Extreme
	Anomaly	Anomaly	Anomaly	Anomaly
Power Density in microWatts/meter squared (µW/m²)	< 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 <u>www.createhealthyhomes.com</u>

The Bottom Line

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



turbohealthcare.com

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

- Reduce use
- Increase distance
- Favor hardwired connections whenever and wherever possible
- Call forward cell phone calls to landline or Google Voice
- Text from hardwired laptop (with WiFi & Bluetooth off)
- Follow protocols on Safer Use of Cell Phones and Safer Use of Computers, at <u>www.createhealthyhomes.com</u>

- Hardwired Local Area Network, or LAN, using Ethernet cable
- Connect to cell phones, computers, printers, TVs
- Installed by low voltage contractor
- Data switch for multiple computers, printers in same room



www.amazon.com



www.amazon.com

- Alternative is MoCA (Multi-media over Cable Alliance)
- Uses existing co-axial TV cables already in walls
- Co-axial cable is shielded
- No dirty electricity generated
- Should be well-tolerated by electrically hypersensitive (EHS)
- Can still run television signals through co-axial cable using splitter



www.amazon.com

- If you are not electrically hypersensitive (EHS), or installing
 Ethernet network is not affordable, and/or coaxial cables are not
 continuous from room to room, use network adapters
- TP-Link AV1000 1 (One) Gbps
- Avoid models with Wi-Fi on second adapter
- Generates dirty electricity on house circuits need capacitor (Greenwave, Stetzer) filters



www.amazon.com

- Manually disable Wi-Fi on router and laptop or desktop computer to get rid of RF from Wi-Fi
- Plugging in Ethernet cable will not automatically disable Wi-Fi on its own on either router or laptop
- Consult with router manufacturer, manual, or Internet
 Technology (I.T.) person to help disable Wi-Fi on router and
 computer



iccinfocentre.com



piratstudenterna.se Oram Miller, BBEC, EMRS

- No cordless keyboard or mouse
- Replace with corded keyboard and mouse, Mac or PC
- Disable Bluetooth on computer
- Turn off power on cordless keyboard and mouse will still transmit in the drawer



hotrdgma.com



<u>aliexpress.com</u>

- Newer Macbooks have no Ethernet port
- Use USB-C-to-Ethernet adapter for newest models or Thunderbolt-to-Ethernet adapter for slightly older models
- Read Safer Use of Computers, at <u>www.createhealthyhomes.com</u>



- Hardwired workaround for iPad and iPhone
- Lightning-to-Ethernet adapter
- Shielded, grounded Ethernet cable (metal ends)
- Ethernet Grounding Adapter Kit to avoid electric fields
- Put device into Airplane mode to avoid RF
- Read Safer Use of Cell Phones, at <u>www.createhealthyhomes.com</u>



- Avoid Wi-Fi when streaming Netflix, et. al. use hardwired Ethernet connection to Apple Player, Roku Player or Smart TV
- Plugging in Ethernet disables network Wi-Fi on Roku, but not Apple TV
- Roku Wi-Fi Direct Connect still transmits
- Use remote outlet switch for power cord to Roku or Apple TV to kill
 Wi-Fi when player is on standby
- Cover player with Signal Tamer, Extra Strength when using
- g







roku.com Oram Miller, BBEC, EMRS

dailydot.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
- Not all icons on antennasearch are cell towers
- Antennasearch is not always accurate



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 U.S.
- Emits harmful beacon signals several times a minute to synchronize smart meters within mesh network
- Also emits much stronger RF signal once or twice per day to transmit data to utility
- Short (20-40 microSeconds), fast rise time and persistent nature of beacon signals (24/7) make smart meters more harmful than Wi-Fi, cell phones
- Many smart meters on garage, away from living space
- Must also pay attention to indoor RF sources



Block RF from outside sources (cell towers,

smart meters, radio & TV towers):

- RF shielding paint
- Fabric for curtains, bed canopy
- Metal window screen, film on windows
- www.lessemf.com
- www.safelivingtechnologies.com





RF Shielding Materials & Fabrics





Y-shield[®] Paint

Scotchtint[®] Window Film



Bed Canopy

Sources of Dirty Electricity Exposure

- Dimmer switches
- Compact Fluorescent Lamps (CFLs)
- Switched Mode Power Supplies in energy-efficient furnaces, variable speed pool pump motors
- Solar System inverters
- Enphase micro inverters and SolarEdge HD Wave PV inverters have lowest dirty electricity



brightearthsolar.com.au



realgoods.com







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
- Use Capacitor Dirty Electricity Filters Greenwave, Stetzer (repair wiring errors first)
- Also whole-house filters—Satic and EMF Safe



consciousspaces.com













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liveemfsafe.com

Chips and Pendants

- I believe they are useful
- Building Biology profession has position paper at buildingbiologyinstitute.org
- No measurable change with EMF meters (with most products)
- Research does support their use:
- Less damage to rat DNA, less Rouleaux formation (clumping of red blood cells on live blood cell analysis), lack of heating of brain tissues on thermography
- Thousands of beneficial personal testimonials
- Do not use as exclusive means of EMF protection



Courtesy Spark Burmaster, EE, BBEC, EMRS



AC Electric Field Basics

- Produced by differences in electric voltage
- Measured with Volt meter and body voltage 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, EMRS



Sources of AC Electric Field Exposure

- AC Electric fields still present when current is not flowing (lamp is off)
- Extends 6-8 feet from plastic wiring (Romex) in walls
- Also extends 6-8 feet from unshielded AC power cords
- Decreases with distance
- Fields present when devices are turned off but still plugged in
- Affects people while sleeping and at desk, couch







Bedside Lamp Cord

www.etsy.com

Sources of AC Electric Field Exposure

Large electric field exposure from:

- I. Electric blankets
- 2. Electric heating pads

3. Water bed heaters

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





EMF Meters and Instruments Electric Fields

- Body Voltage
 Meter
- Hand-heldMeter







Courtesy Spark Burmaster, EE, BBEC









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 nighttime 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

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

- Plastic Romex circuits in bedroom walls and floor cause electric fields that extend
 6-8 feet into bedroom
- Avoid electric fields around each bed
- Follow protocol to identify circuits to shut off, at <u>createhealthyhomes.com</u>
- Electrician can install remote shut-off switches to turn off bedroom circuits
- RCS4 Safe Living Technologies and EMF Safe Switch



hdimagegallery.net



safelivingtechnologies.com



liveemfsafe.com

Reduce Electric Field Exposure — Metal-Clad Circuits in Walls

- Create an electrically clean sleeping environment
- Flexible MC (metal clad) or rigid (EMT) conduits do not emit electric fields into room
- No need to shut off breakers
- Use remote outlet plug-in switches, shielded power strip
- Rewire lamps, appliances with shielded
 AC power cord (Mu Cord)





amazon.com

bn-link.com



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")
- Extensive research of health benefits

Also reported to shunt man-made electric fields to earth through your body from plastic circuits in walls & AC cords

Some electrically-sensitive people report feeling worse,

even though "body voltage" meter shows low levels

We recommend Earthing Pad as well as reducing electric field exposure levels in bedroom by shutting off circuits



radiantlbfecatalog.com

Reduce Electric Field Exposure at Your Desk

- Ungrounded Laptop AC Power Cords PCs
- Big source of vitality-draining, unhealthy electric fields
- Many laptops have two-pronged (ungrounded) plugs
- Plug needs to be three-pronged (grounded)
- Purchase USB Ground Cord from <u>www.lessemf.com</u>
- Also, outlet needs to be grounded
- Purchase circuit tester from hardware store to test
- ground at outlet both amber lights need to be lit



lessemf.com



popscreen.com

Two-pronged plug:



ebay.com

Three-pronged plug:



popscreen.com

Reduce Electric Field Exposure at Your Desk

Ungrounded Laptop AC Power Cords – MacBooks

For Mac laptops, use Apple power adapter extension cable with three-pronged plug
Do not use two-pronged adapter that slides directly onto inline transformer
Pull two-pronged adapter off transformer, shown in upper right corner on left, and slide on extension cable shown on right with three-pronged plug
Newest models of MacBooks do not include extension cable with laptop
Purchase Apple power adapter extension cable from Amazon or Apple

Two-pronged plug:





laptopbatterylife.com



mactechgear.com



shop.accessory4you.com

AC Magnetic Field Basics

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



Courtesy Spark Burmaster, EE, BBEC, EMRS



AC Magnetic Field Basics

- Magnetic 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
- Magnetic fields are cancelled when wires run together — modern Romex, flex



Courtesy Spark Burmaster, EE, BBEC, EMRS



AC Magnetic Field Basics

- Magnetic field shielding is difficult and very expensive
- Requires special materials, such as
 G-iron and Mu Metal from

www.lessemf.com

- Best to eliminate magnetic field 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, Gigahertz
 Solutions Gauss Meters (single axis)
- Magnii, Tri-Field TF2 Gauss Meters (triple axis)
- "Buzz Stick"
- See EMF Meters and Instruments at

www.createhealthyhomes.com

Buzz Stick





Single Axis Gauss Meters





s Magnii Gauss Meter Oram Miller, BBEC, EMRS



Tri-Field TF2

Gigahertz Solutions
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	Slight	Severe	Extreme
	Anomaly	Anomaly	Anomaly	Anomaly
Flux Density in milliGauss (mG)	< 0.2	0.2 - 1	I - 5	> 5

Four major sources of AC magnetic fields in homes:

I. 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







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 TV cable sheathing







Courtesy Spark Burmaster, EE, BBEC, EMRS

- 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

- 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





Courtesy Spark Burmaster, EE, BBEC

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/desk 2-3 feet away from feet and legs
- Current on return neutral wire needs to be in same conduit or "raceway" as outgoing hot wire, and be equal to avoid wiring error
 Current should only flow on intended paths (insulated wires), not on grounding paths (avoid "objectionable" current on ground wire)

- M. Spark Burmaster, EE, BBEC, and Nat. Elec. Code (NEC)

Reduce Magnetic Field Exposure

- Keep 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 electric current produces AC magnetic fields
- Pressure of voltage produces AC electric fields
- EMFs occur at various frequencies
- Meters and instruments used as detectors
- EMFs 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, meaning on insulated hot and neutral wires within circuits
- Keep current off grounding paths, including metal water pipes and TV cable sheathing
- Check for wiring errors prior to home purchase or rental
- Avoid proximity to point sources: breaker panel, refrigerator, transformer, digital clock at front of stove or dishwasher
- Do not purchase, rent or build home, school, office near power lines

Summary of Steps to Reduce EMFs Electric Fields

- Metal-clad (MC) circuits, "Flex" or EMT, around children's bedrooms as well as desks, couches and children's play areas
- Manual or remote outlet shut-off switches 6-8 feet of bed
- Remote shut-off switch for plastic bedroom circuits
- Rewire lamps with shielded cord (MuCord)
- Move unshielded cords away from feet & legs at desk
- Grounded AC power cord for laptops
- Grounded, shielded Ethernet cables, Ethernet Grounding
 Adapter Kit, properly grounded Ethernet adapters

Summary of Steps to Reduce EMFs Radio Frequencies

- Reduce Use
- Increase distance
- Favor hardwired connections for Internet, telephone, TVs and players, security system, music speakers, thermostats, baby monitors — "Safer Use of Cell Phones" article
- Opt out or shield smart meters
- Live one-half to three-quarters of mile from cell towers
- Avoid 4G LTE/5G small cell antennas in residential neighborhoods
- Shield walls and windows as necessary

Summary of Steps to Reduce EMFs Dirty Electricity

- Replace CFLs with incandescent light bulbs or LED bulbs
- Straight on/off switches vs. dimmers
- Central lighting control system dimmers (Lutron, Crestron, Control4, Savant, Vantage) more clean than off-the-shelf dimmers
- Avoid solar panel inverters except Enphase micro inverter or SolarEdge HD Wave inverter (low dirty electricity)
- Avoid variable speed forced air furnace/air conditioner motors
- Replace smart utility electric meter with analog electric meter

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