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What's the Diagnosis, Doctor?

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A case study: A 56 year-old high-functioning professional man presents with a recent decline in mental capacity, daily headaches and insomnia. He has a history of chronic carbon monoxide (CO) poisoning in 2010, manifesting as rapid mental decline and severe headaches, which improved dramatically hours after identifying and removing the CO source, a faulty gas heater. He had a slow, incomplete recovery over the next year, measurable by an improved capacity to do focused mental work. After a second year of relative stability, he began getting worse during the third year out, 2013. Mental resilience is again declining, and appears noticeably worse after spending time in the office building where he has worked for 15 years. Non-focal headaches and insomnia are also frequent. He has no significant physical symptoms from the neck down. He exercises almost daily and has noticed no significant decline in strength or endurance.

The patient's story: “What’s the diagnosis, doctor?” For weeks on end, several times a day, I asked myself that question. You see, that previously high-functioning professional was me, and by early 2013 I was not functioning well at all.

I did lots of research and consulted several specialists. Ideas and tests were pursued, but nothing definitive was discovered. Could it simply be that, after two years of improvement and stability, the CO poisoning was now entering a second stage of decline? Or was something new developing, in particular something that was made worse whenever I went to Hospice of Petaluma, my workplace of many years?

An important shift in my thinking occurred when I developed severe confusion and headache during monthly meetings held at our sister program, Memorial Hospice, which had just moved into a newly remodeled building. I wondered: Is it the carpet degassing that others have complained about? Or is it the wireless broadcaster on the ceiling of the meeting room? The latter got me thinking about the wireless system at our Petaluma office, which had been installed nine months earlier—around the time I had begun getting worse.

My suspicions aroused, I decided to do a “scientific trial.” At home I had a router with both a wireless and wired option (for some time I had been using only the wired connection). For 30 minutes I sat with eyes closed a few feet from the router and, at an unknown time, a friend turned on the silent wireless function. About 10 minutes into the trial, I started having a piercing headache: sharp and pointy going up the middle of my brain just left of midline. My friend confirmed that he had turned the router on less than a minute before I had become symptomatic. Might this be the answer?

A few hours of internet research and I had a diagnosis – “electromagnetic hypersensitivity” (EHS) – along with information about what to do, most of which focused on avoidance and/or shielding. But clearing the environment of radiofrequency radiation, turns out, is no easy task. With a newly-bought radiowave meter in hand, I began mapping out my world and soon discovered how ubiquitous this technology is. Wireless routers and computers. Cell phones and cell towers. Cordless phones and microwave ovens. Smart meters and smart keys. I recently heard a physician-speaker estimate that the current density of radiowaves, per cubic inch of air, is now several million times greater than what it was ten years ago.

For months after the self-diagnosis I worked closely with an experienced consultant, meticulously testing my environment, keeping a detailed journal about exposures and symptoms, and completing an array of shielding and rewiring projects. As I write now, a year has passed and, as a result of all that I’ve learned and done, I feel great most of the time. The best I have in years — since before the CO poisoning.

That said, I remain extremely vulnerable to any surprise radiowave exposure. Getting “zapped” I call it. When that happens, an all-too-familiar pattern unfolds: within an hour my brain feels unnaturally activated, like a shot of mental caffeine; an hour or two later a headache starts and mental function slows; a poor night of sleep follows; and the next day I awaken feeling mentally washed out. It takes 24 hours to feel okay and 48-72 hours to return to normal. Borrowing from a leading theory about EHS, the CO poisoning may have caused blood-brain barrier damage and, since then, voltage-gated ion channels are now triggered by radiowaves, prompting unwanted chemical leakage into the brain.

With 60-80 exposures in the last year, I have, in effect, repeated my original “experiment,” over and over. Cause and effect are beyond question now, as it would be if a person with a suspected drug allergy took that drug many times and repeatedly developed the same rash. Using a radiowave meter to closely monitor peak exposures, I have learned that my threshold for risk with an exposure is at, or above, $0.001 \mu\text{W}/\text{cm}^2$. Current American standards, however, would tell us we are safe at radiowave levels up to $100 \mu\text{W}/\text{cm}^2$: 100,000 times higher than my danger threshold.

Seems I’m a classic “canary in a coalmine.” That’s why I write.

Electromagnetic hypersensitivity – a brief historical review: “Radiowave sickness” was first named and described in 1932, with most of the early cases being discovered in military personnel. The advent of the personal computer in the 1980s led to a growing number of cases of EHS, mostly due to low-frequency electromagnetic fields, while the subsequent increase in cellphone use and other wireless technologies was followed by a rise in radiowave-related cases. In 2005 the World Health Organization (WHO) coined the term “electromagnetic hypersensitivity” to encompass symptoms caused by any electromagnetic field (EMF), independent of frequency.

ELECTROMAGNETIC HYPERSENSITIVITY

Abbreviated list of possible symptoms

1. Auditory: earaches, tinnitus
2. Cardiovascular: dysrhythmias
3. Dermatologic: rashes, facial flushing
4. Musculoskeletal: weakness, spasms
5. Neurological: headaches, poor concentration, sleep problems, fatigue
6. Ophthalmologic: dry or itching eyes, impaired vision
7. Psychological: irritability, anxiety, depression, panic attacks
8. Respiratory: cough, throat irritation

Possible precursors

1. Physical trauma to brain or spinal cord
2. Electro-trauma: e.g. electric shock, lightning strike, acute or chronic electrical exposures
3. Chemical trauma: e.g. CO poisoning, exposure to toxic chemicals, metal implants
4. Biological sensitivities or allergies
5. Impaired immune function: e.g. people with autoimmune diseases, the elderly, infants

Not coincidentally, WHO recognition of the syndrome came three years after their director general, Dr. Gro Harlem Brundtland – a physician and former prime minister of Norway – publically revealed that she had severe EHS. Her disclosure likely enhanced Europe’s role as a world leader in both research and public policy. While debate about the validity of an EHS diagnosis still exists in Europe, a variety of organization there have taken forward-thinking steps to address a rising concern. In 2007 the European Environmental Agency called for a reduction in acceptable levels of radiowave exposure, with several countries adopting these revised limits. In 2009 the European Union parliament voted to recognize EHS as a disability, again with some countries following this lead. In 2011 the WHO’s International Agency for Research on Cancer classified radiofrequency EMFs as possibly carcinogenic for humans (Group 2B). And in 2011 the Parliamentary Assembly of the Council of Europe adopted a report on EMF dangers recommending that “all reasonable measures” be taken to reduce EMF exposures, especially cell phone use by young people given their vulnerability to getting brain tumors.

In parallel with the above public policy measures, a unified medical response also has developed in a number of European countries; two examples are worth highlighting. In 2008 Swiss Doctors for the Environment (www.aefu.ch) created a physician working group, “Electromagnetic Fields and Health,” which serves as the coordinating and consulting center for a nationwide network of general practitioners caring for people with EMF health issues. And in 2012 the Austrian Medical Association published detailed guidelines for the diagnosis and treatment of EMF-related health problems (see the final sidebar for a link to an English version).

The United States has lagged far behind Europe, in both general understanding and a public health response. Current American guidelines for safe exposure are decades-old and were based on studies measuring the intensity of radiowave radiation needed to heat body tissue, analogous to using a microwave to cook food. Many studies have since demonstrated that non-thermal effects can occur at much lower levels. Leading researchers in this field have advocated that American public health guidelines be based on non-thermal effects, not just thermal, describing the recent evolution in understanding as a classic example of a shift in scientific paradigm.

In 2013 the American Academy of Environmental Medicine (AAEM) sent a letter to the Federal Communications Commission urging a marked reduction in radiowave exposure limits, more in line with some countries in Europe. Here’s an excerpt from that letter:

It became clear to AAEM physicians that by the mid 1990’s patients were experiencing adverse health reactions

BIOINITIATIVE 2012: A SUMMARY OF EXISTING RESEARCH

Authored by an international panel of scientists and physicians and chaired by two Americans, this 1479-page report reviewed about 1800 new studies published in the five years, updating their first report completed in 2007.

an excerpt from the report’s summary

“Several thousand scientific studies over four decades point to serious biological effects and health harm from EMF [electromagnetic fields] and RFR [radiofrequency radiation]. These studies report genotoxicity, single and double-strand DNA damage, chromatin condensation, loss of DNA repair capacity in human stem cells, reduction in free-radical scavengers (particularly melatonin), abnormal gene transcription, neurotoxicity, carcinogenicity, damage to sperm morphology and function, effects on behavior, and effects on brain development in the fetus of human mothers that use cell phones during pregnancy.”

The full report can be found at www.bioinitiative.org

and disease as a result of exposure to electromagnetic fields. In the last five years with the advent of wireless devices, there has been an exponential increase in the number of patients with radiofrequency induced disease and hypersensitivity.

Numerous peer reviewed, published studies correlate radiofrequency exposure with a wide range of health conditions and diseases. These include neurological and neurodegenerative diseases such as Parkinson's Disease, ALS, paresthesias, dizziness, headaches and sleep disruption as well as cardiac, gastrointestinal and immune disease, cancer, developmental and reproductive disorders, and electromagnetic sensitivity.

Doubt and indifference still exist about the growing body of literature concerning EMF health effects. Are the peer-reviewed studies mentioned above of sufficient quality to give us a definitive answer about the dangers? An international panel of experts authored the BioInitiative 2012 Report, a 1479-page review of over 1800 studies, and concluded that sufficient quality research already exists and that new safeguards should be implemented.[3] In contrast, the American approach is to insist that more research be done.

Our current public health policy runs contrary to "the precautionary principle," which states that if an action or policy has a suspected risk of causing harm to the public or the environment, and no clear scientific consensus exists, then the burden of proof falls on anyone initiating a potentially risky action or policy to demonstrate that harm is not being done. Laws of the European Union make the application of this principle a statutory requirement (though it's not always followed), while in the United States no equivalent limitations exists.

Several factors serve as obstacles to the U.S. taking this precautionary approach with radiowave technology: the potentially offensive agent is silent, invisible, and odorless; the technologies offered are ubiquitous and addictive; and the telecommunications industry is wealthy and powerful. In the coming decades definitive research will likely confirm or deny suspected dangers. In the meantime, though, we are conducting a large-scale, uncontrolled public health experiment that may have dire consequences for some, if not many.

How a physician can help: The number of cases of EHS is on the rise, says the AAEM. So how might you help people who come to you with this problem?

I turn again to Europe for information and guidance. I have been in regular contact with two members of the aforementioned Swiss group focusing on EMF health issues, both to receive consultation about my own health situation and to garner general advice for physicians caring for patients with EHS. The following recommendations combine advice received from these experts, a review of the aforementioned Austrian guidelines, and my own personal experience from this past year.

- 1. Take the patient's symptoms seriously.** Some people with suspected EHS will have a confirmable diagnosis; some will have other environmental issues; some will have a psychiatric or psychosomatic illness; and some will have a combination of the above. Regardless of which category into which a patient falls, a physician's support is vitally important in helping diagnose, support and treat.
- 2. Take a full history and physical.** Diagnose and treat other disorders where possible, while also taking a detailed environmental history that explores not just electromagnetic issues, but chemical sensitivities, carbon monoxide, air pollution, and mold. See the Austrian Medical Association guidelines (last sidebar) for an outline of a full work-up.

3. **Have the patient keep a detailed symptom diary.** Learning about one's environment, including testing the effects of any interventions made, can be a long and convoluted process. Consider this journal to be a foundational record for this journey of discovery. As an example, a few lines can be written each day under the headings: Date, Possible Exposures, Daytime Symptoms, Sleep, and Morning Symptoms.
4. **Help the patient design exposure experiments to confirm or deny a suspected cause.** As an example, a blinded exposure to a wireless router, turned on and off by another person, can help define a true sensitivity to radiowave technology.
5. **Advise the patient to take simple steps toward reducing EMF exposure.** This may include using a land-line phone whenever possible (instead of a cordless phone or cell phone); using the speaker phone feature of a cell phone if it must be used and turning the cellphone off when not in use; changing internet connectivity from wireless to wired; shielding Smart Meters or having PG&E turn them off. See the side-bar "On-line Resources for Patients" for websites with more detailed information.
6. **If indicated, encourage the patient to have EMF levels evaluated at home and/or work.** Different people with EHS will have varying degrees of sensitivity to different kinds of electromagnetic fields. Testing should include meters suitable for measuring low frequency electric fields and magnetic fields, high frequency radiowaves, and medium frequency "dirty electricity" (distortions of the usual sinusoidal AC electric current). Ideally this will be done by a knowledgeable, well-equipped electrical consultant. Alternatively, meters costing \$100-200 can be purchased to begin this process of evaluation (though some people with severe EHS are reactive to the meters themselves and are unable to use them).
7. **Recommend a diagnostic camping trip, if this is within a person's capabilities.** Careful journaling about symptoms before, during and after the trip may help to clarify if an environmental sensitivity is present. The task of

ON-LINE RESOURCES

FOR PHYSICIANS

<http://freiburger-appell-2012.info/media/EMF%20Guideline%20OAK-AG%20%202012%2003%2003.pdf>

English version of the Austrian Medical Association's guidelines for the diagnosis and treatment of EMF-related health problems.

www.magdahavas.com

Dr. Havas is a leading researcher in the health effects of electromagnetic fields.

www.bioinitiative.org

The full 1479-page report summarizing research into the health effects of EMF.

FOR PATIENTS

www.emfsafetynetwork.org

A Sonoma County based advocacy group with links to other sites.

www.emfcenter.com

Website of a local Sonoma County electromagnetic field consultant.

www.electrosense.com

A European site with information about making a home or office safe.

www.electromagneticman.co.uk

A U.K. site with information, including videos of people with EHS.

www.weepinitiative.org

A Canadian website with information, including the pamphlet "Living with Electro-hypersensitivity: A Survival Guide."

www.lessemf.com

An on-line store for meters, shielding material, and other related products.

identifying the source – be it at home or work – will still remain.

8. **Encourage a healthy lifestyle.** This includes quality food and water, regular exercise, good sleep hygiene, and spending time in nature on a near daily basis.
9. **Consider aerobic exercise with heavy sweating soon after a strong EMF exposure.** This can help mitigate symptoms from an exposure, though caution is advised if exercise is contraindicated for any reason (e.g. coronary artery disease, electrolyte disorders, neuromuscular diseases, etc).
10. **Encourage cultivation of the relaxation response.** Excess brain stimulation – with attendant anxiety, agitation and insomnia – can be major problems for the person with EHS. Cultivating deep relaxation with meditation, yoga, massage, hot baths or other modalities can be very healing.
11. **Encourage the avoidance of excess blue light (e.g. from computers and televisions) during the two hours before sleep; or if not avoidable, recommend blue-filter glasses.** The blue portion of the light spectrum has been shown to delay the onset of sleep more than other parts of visible light. Quality sleep is essential for the healing of any EMF-related brain injury.
12. **Support the patient’s exploration of complementary therapies.** Functional medicine treatment (e.g. to address oxidative stress and/or mitochondrial dysfunction) and bodywork can be beneficial. In addition, therapies that resonate with a patient’s own ideas about healing may play a role.
13. **Refer for counseling as indicated.** The experience of having one’s environment feel unsafe can induce profound secondary psychological effects, even in people without previous mental health problems. Manifestations may include fear, panic, anxiety, shame, avoidance, helplessness, depression, and insomnia – to name just a few. It can’t be emphasized enough: do not dismiss the possibility of physical disease by over-interpreting these secondary psychological symptoms as mere paranoia, hypochondriasis, or mental illness.

I close on a personal note. The crescendo of physical symptoms I experienced a year ago was overwhelming, but almost as bad was the fear and shame I felt that others would think I was “crazy.” The understanding and support I received from friends and colleagues, especially fellow physicians, was hugely important in surviving this dark and difficult time. If patients come to you suspecting they might have EHS, I offer this simple encouragement: *Believe what they say.* That alone will help immensely.

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