A Basic Summary of the Neurological Effects of Radiofrequency Sickness

Utility companies nationwide are moving toward installing transmitting electrical, gas, and water meters at each customer's service. The new digital meters being installed on electrical services are a type of meter being called "smart" meters because they can do time of day metering, keep very close track of energy usage, and potentially perform other functions. In the case of We Energies, and most other utilities, the "smart" meters selected are **transmitting** "smart" meters. The transmitting electrical rate meters We Energies is using transmit in strong bursts every 6 seconds 24 hours per day 7 days a week. The other utility meters also transmit similarly. This is potentially dangerous in the long-term for everyone; however, for people who already have radiofrequency sickness this exposure can cause disability nearly immediately.

Radiofrequency sickness results from overexposure to radiofrequency radiation. (See Appendix 1 for symptoms.) Radiofrequency sickness is not a disease. It is an environmentally induced functional impairment. Radiofrequency sickness has real and disabling consequences. People with radiofrequency sickness experience illness (or even death) upon exposure to radiofrequency radiation.[1,2,3,4] The most common sources are electrical pollution – high frequencies that travel on building wiring – and transmitters – all wireless devices.

Detrimental biological effects, distinct from tissue heating effects, have been extensively documented in studies at a range of different frequencies and at levels below the current United States safety standard.[5]

Our current safety regulations are not designed to protect people from the non-thermal hazards posed by transmitting meters or other devices. The FCC "safety" guidelines are solely designed to protect a 6 ft 185 lb man from tissue heating during a short (6 minute) exposure. They are not designed to protect even a 6 ft man from biological effects during a continuous exposure.[6,7] Exposures from transmitting utility meters and other transmitters are continuous, so these "safety" standards are meaningless. Transmitting devices compliant with current safety standards should not be allowed to portray themselves as "safe". The fact that these transmitters are represented as being "safe" because they comply with FCC guidelines is part of the reason that people are being required to have transmitting utility meters. Additional studies are now available. The data warrant complying with the precautionary principle and establishing lower exposure standards for safe levels of exposure for chronic exposures to radio frequency radiation for the population as a whole.[8] Exposure is often involuntary. For instance, exposure to radiofrequency radiation from neighbors often causes sensitive people in town to be chronically ill, unable to recover.

Microwave and radiofrequency radiation are now being associated with attention deficit disorder, autism, sleep disorders, multiple sclerosis, Alzheimer's disease and epilepsy, as well as asthma, diabetes, malignant melanoma, breast cancer, and other illnesses that have become increasingly more common. Please see www.bioinitiative.org* to read a 2007 review of the peer-reviewed science on the long-term risks of exposure to transmitted microwave and radio frequency

---

* Sections of *The BioInitiative Report* was updated in 2009 and published in a special issue of the peer-reviewed journal *Pathophysiology* available at:
http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235138%232009%23999839997%231345066%23FLA%23&_cdi=5138&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=46db922ea4d2a2352e7490de7de6c785

radiation. Studies finding no health effects are predominantly industry funded.[9] A report by Hallberg and Johansson[10] published recently in *Pathophysiology* asks the provocative question about whether the recent (1997 and later) increase in exposure to microwave frequencies may be responsible for the recent decline in public health in Sweden. The data seem to say that public exposure to microwave frequencies is a likely culprit.

In addition to transmitting in strong bursts, transmitting "smart" meters can also overexpose the general population to high frequencies by putting high frequencies on home and building wiring, either deliberately through signaling or inadvertantly through poor engineering. High frequency signals on power lines are also biologically active. Milham and Morgan found a dose-response relationship between high frequencies present on building wiring and cancer[11]. Recent analysis of historical epidemiological data indicates a relationship to cancer, diabetes, heart disease, and suicide[12]. Removing high frequencies on building wiring has improved MS symptoms, blood sugar levels, asthma, sleep quality, teacher health, student attentiveness, headaches, ADD, and numerous other health problems[13,14,15]. Technical papers provide a solid electrical and biomolecular basis for these effects. A recent paper by Ozen showed that transients induce much stronger current density levels in the human body than does the powerline 60Hz signal[16]. A technical paper by Vignati and Giuliani discusses the authors' findings that high frequency communication signals on power lines also induce much stronger electrical currents in the human body than a low frequency signal of the same strength[17]. The induced currents disturb normal intercellular communications. This causes harmful short-term and long-term effects. Additional information can be found on www.electricalpollution.com. Information necessary to properly measure the high frequencies causing these health problems can be found on the Technical page. A simple meter is also available that can provide accurate measurements of electrical pollution levels in most situations.

The precautionary principle dictates that only utility meters that do not increase public exposure to microwave and radiowave radiation and "dirty" power should be used while conservative standards to protect the health of the general population during continuous exposure are researched and established. Safe technology is available that can be used to perform the same functions as transmitting "smart" meters. There are non-transmitting meters that can do variable rates and meter both incoming and outgoing power. Meters can easily be engineered that do not put high frequencies on electrical wiring either inadvertantly or deliberately, while still performing all necessary functions. Directly wired connections could be used to shut off key loads. Alternate technologies may cost a bit more up front, but the precautionary principle should apply. In fact, the Health Department in New Mexico agrees. They recently pursuaded a local water utility to use wired connections between monitoring stations, instead of wireless, based on the precautionary principle. If you have questions, you can contact John McPhee, Childhood Injury Prevention Coordinator for the New Mexico Department of Health (505-827-2582).

The only "cure" for radiofrequency sickness is not to be exposed to radiofrequency radiation. People with radiofrequency sickness often become ill almost immediately upon exposure, although the severity of the illness depends on how often the exposure occurs, the frequency and amplitude of the radiation signal and the duration of the exposure. Studies show pulsed microwaves, as utilized by modern communication devices, including transmitting electrical meters, are very potent biologically.[1,2,3,4]

In fact, data presented at the recent conference "Electromagnetic Radiation Impacts on Human Health" sponsored by The EMR Policy Institute showed that radiofrequencies, specifically pulsed modulated microwaves from a DECT cordless telephone base unit can have an instantaneous effect on heart rhythm in susceptible individuals. This technology is the same as that used by cellphones, WiFi internet access, and transmitting utility meters. See: http://www.youtube.com/user/EMRPolicyInstitute presentation of Prof. Magda Havas in three segments.

A number of studies show that electromagnetic radiation, including radiofrequency radiation, alters heart rate variability, blood pressure (including inducing hypertension with microwave exposure – smart meters transmit in the microwave range) and increases risk of arrhythmia related heart disease and heart attack.[4,5]

There is extensive documentation in the literature of alterations of Ca^{2+} homeostasis.[5] This is likely to be responsible at least in part for the profound effects that radiofrequency radiation has on the heart and neurological function. Ca^{2+} regulates gap junction opening. Gap junctions are key in many intercellular communications.

Exposure to radiofrequency radiation also interferes with the action of enzymes, signaling pathways, and makes the immune system simultaneously hyperactive and less effective.[5,18] Immune impairment results in part from the disruptive effect of radiofrequency radiation on calcium ion homeostasis. In addition to radiofrequency radiation-induced immune impairment increasing risk of various types of infection, it is likely to increase the risk of getting cancer from the DNA breakages radiofrequency radiation is well-documented to induce.[5] While radiofrequency radiation is non-ionizing, the metabolic changes it can cause result in oxidative damage to DNA and subsequent breakage. Direct interactions between radiofrequency radiation and DNA can have similar results, as well as causing changes in gene transcription, through changes in electron flows induced by the radiation.[19]

Neurological function can be seriously impaired by radiofrequency radiation. Cholinesterase enzyme activity is impaired by exposure to radiofrequency radiation in a manner similar to impairment caused by organophosphate pesticides often rendering a person with radiofrequency sickness particularly sensitive to small amounts of chemicals.[20] Radiofrequency radiation can lower the pain threshold, slow reaction times, cause fatigue, muscle weakness, headaches, difficulty concentrating, short-term memory problems and even memory loss.[1,2,3,4] These may be caused by disruption of Ca^{2+}, disruption of various enzyme pathways, induction of the stress response and associated effects, increased permiability of the blood-brain barrier, or various other effects of over exposure to radiofrequency radiation.[4,5,20]

Radiofrequency radiation significantly decreases melatonin levels and decreases the ability of existing melatonin to fight cancer.[5] Good sleep is essential for good mental and physical health. Good sleep is very difficult, if not impossible to obtain if your melatonin levels are abnormally low. Sleep deprivation along with impaired neurological function and enzyme impaiment are likely to be behind the brain fog and cognitive difficulties those with radiofrequency sickness experience.

More detailed information can be found in the following references, in *The BioInitiative Report* at www.bioinitiative.org, and at www.electricalpollution.com.

References

1) Johnson Liakouris AG. Radiofrequency (RF) sickness in the Lilienfeld study: An effect of modulated microwaves Archives of Environmental Health; May/Jun 1998; 53, 3.

2) Santini R, Santini P, Le Ruz P, Danze JM, and Seignel M. 2003 Survey Study of People Living in the Vicinity of Cellular Fhone Base Stations. Electromagnetic Biology and Medicine Vol. 22, No. 1, pp. 4149.

3) Hyland GJ. Physics and biology of mobile telephony. The Lancet, Vol 356, November 25, 2000.

4) Marha K, Musil J, and Tuha H. Electromagnetic Fields and the Life Environment. Institute of Industrial Hygiene and Occupational Diseases, Prague, Czechoslovakia. English Translation 1971

5) Cherry, N. 2000 Criticism of the Health Assessment in the ICNIRP Guidelines for Radiofrequency and Microwave Radiation (100 kHz- 300 GHz)

6) Letter from Norbert Hankin, Center for Science and Risk Assessment, Radiation Protection Division, EPA, regarding the limitations and purpose of the FCC exposure standards. http://www.emrpolicy.org/litigation/case_law/docs/noi_epa_response.pdf

7) Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communication, 2008, National Academy of Science. http://www.nap.edu/catalog.php?record_id=12036#toc

8) Sage C, Carpenter DO. 2009. Public health implications of wireless technologies, Pathophysiology Aug; 16(2-3):233-46.

9) Huss et al., "Source of Funding and Results of Studies of Health Effects of Mobile Phone Use: Systematic Review of Experimental Studies", Environmental Health Perspectives, 115(1): 1-4, 2007. http://www.ehponline.org/members/2006/9149/9149.pdf.

10) Hallberg O, Johansson O, Apparent decreases in Swedish public health indicators after 1997 – Are they due to improved diagnostics or to environmental factors? Pathophysiology Volume 16, Issue 1, June 2009, Pages 43-46.

11) Milham S, Morgan L. A new electromagnetic exposure metric: High frequency voltage transients associated with increased cancer incidence in teachers in a California school, American Journal of Industrial Medicine, Volume 51, Issue 8, Date: August 2008, Pages: 579-586

12) Milham S. Historical evidence that electrification caused the 20th century epidemic of "diseases of civilization". Medical Hypotheses DOI: 10.1016/j.mehy.2009.08.032

13) Havas M, Olstad A. Power quality affects teacher wellbeing and student behavior in three Minnesota Schools, Science of the Total Environment, Volume 402, Issues 2-3, 1 September 2008, pp. 157-162.

14) Havas M. 2008. Dirty Electricity Elevates Blood Sugar Among Electrically Sensitive Diabetics and May Explain Brittle Diabetes. Electromagnetic Biology and Medicine, 27:135-146. http://www.informaworld.com/smpp/content~db=all?content=10.1080/15368370802072075

15) Havas M. 2006. Electromagnetic hypersensitivity: biological effects of dirty electricity with emphasis on diabetes and multiple sclerosis. Electromagnetic Biology Medicine 25(4):259-68.

16) Ozen, S. 2007. Low-frequency Transient Electric and Magnetic Fields Coupling to Child Body, Radiation Protection Dosimetry (2007), pp. 1–6. http://rpd.oxfordjournals.org/cgi/content/full/ncm315

17) Vignati, M. and L. Giuliani, 1997. Radiofrequency exposure near high-voltage lines. Environ Health Perspect 105(Suppl 6):1569-1573 (1997) http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1469914

18) Johansson O. Disturbance of the immune system by electromagnetic fields—A potentially underlying cause for cellular damage and tissue repair reduction which could lead to disease and impairment, Pathophysiology, Volume 16, Issues 2-3, August 2009, Pages 157-177.

19) Blank M and Goodman R. Electromagnetic Fields May Act Directly on DNA, Journal of Cellular Biochemistry 75:369-374 (1999)

20) Grant L. Microwaves Imitate Pesticides. U.S. Department of Energy Risk Management Quarterly, Volume 5-3

Appendix 1- Symptoms of Radio Wave Sickness (excerpted from *No Place To Hide* April 2001):

- **Neurological:** headaches, dizziness, nausea, difficulty concentrating, memory loss, irritability, depression, anxiety, insomnia, fatigue, weakness, tremors, muscle spasms, numbness, tingling, altered reflexes, muscle and joint paint, leg/foot pain, "Flu-like" symptoms, fever. More severe reactions can include seizures, paralysis, psychosis and stroke.
- **Cardiac:** palpitations, arrhythmias, pain or pressure in the chest, low or high blood pressure, slow or fast heart rate, shortness of breath.
- **Respiratory:** sinusitis, bronchitis, pneumonia, asthma.
- **Dermatological:** skin rash, itching, burning, facial flushing.
- **Ophthalmologic:** pain or burning in the eyes, pressure in/behind the eyes, deteriorating vision, floaters, cataracts.

Others: digestive problems; abdominal pain; enlarged thyroid, testicular/ovarian pain; dryness of lips, tongue, mouth, eyes; great thirst; dehydration; nosebleeds; internal bleeding; altered sugar metabolism; immune abnormalities; redistribution of metals within the body; hair loss; pain in the teeth; deteriorating fillings; impaired sense of smell; ringing in the ears.