



Medical Alert –

“An Ounce Of Prevention Is Worth A Pound of Cure”

Leukemia and Diabetes Increase with Electrical Exposure (EMF)



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Credible scientific journals have reported that excessive exposure of humans and animals to electric and magnetic fields (EMF) can affect mental and physical health of people and animals.

Concern of health officials about increasing diabetes, obesity, and deaths from childhood leukemia of the U.S. population are reported daily in local news. This review relates mainly to recent discoveries showing relationships of EMF to diabetes and leukemia, although evidence for brain tumors and Non-Hodgkin's lymphoma is equally apparent.

EMF in some homes, schools, and workplaces may be excessive where utility primary neutrals are grounded to earth and bonded to secondary (user) neutral conductors and to water pipes which permeate the walls and living environment of premises. Exposure to electronic equipment emitting excessive EMF contributes further to radio frequency radiation (RFR) sensitivity and illness.

State and Federal Agencies monitor the quality of milk, food, and water for contamination from dirt, microbial pathogens, and toxins on a regular basis. Penalties are severe and repetitive violators are excluded from the markets.

Electricity and EMF permeate the premises of every citizen, yet no monitoring nor protection from dirty electricity is enforced by law while utilities are increasingly deregulated and contributing to pollution.

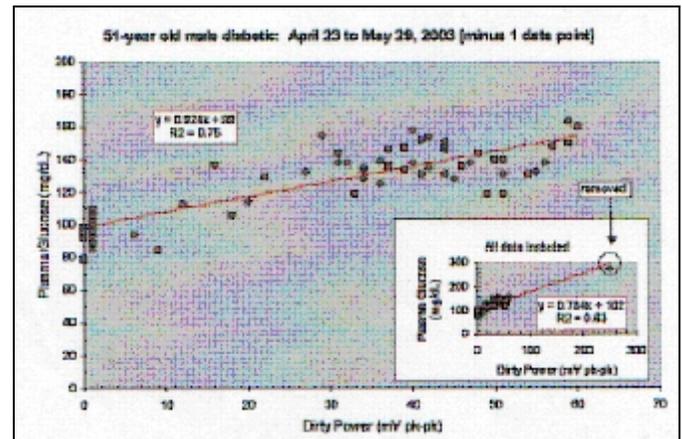
Diabetes claimed 69,301 lives in 2000. Today in the United States there are 18.2 million diabetics; a third of whom aren't aware they have the disease. Every year 1.3 million more new cases are diagnosed in people 20 years and older, according to the Joslin-Diabetes Center in Boston, the American Diabetes Association, and the Associated Press. Diabetics are more prone to heart disease, stroke, high blood pressure, nervous system disease, and amputations [Lansing State Journal, 9/28/04].

New Discoveries should stimulate a variety of research projects, encourage evaluation of the electrical environment of patients, and help to identify particularly adverse EMF components, with cooperation of local electrical interests and health authorities.

EMF Increased Blood Sugar of Diabetics, Reduced Insulin Secretion of Laboratory Animals

- Blood plasma glucose of diabetics increased as measures of electricity (millivolts and microsurgues) increased in the environment of patients diagnosed with diabetes. Fasting glucose increased from 100 mg/DL to 160 mg/DL as electricity in the environment increased from 0 to 60 millivolts (mV).

- The diabetes observation was reported at the International Conference on Childhood Leukaemia, London, England, September 6-10, 2004 [9].



- Secondly, reducing electrical pollution (high frequency electrical noise) by use of microsurge filters plugged into wall outlets resulted in blood glucose decreasing within minutes. Fasting blood sugar decreased from average 171 to 119 mg/DL.
- Insulin use decreased from 36 to 9 units (Humlin 70/30) per day when the filters were installed in the home of an elderly person with diabetes.
- While the number of patients was small, the relationship between glucose and electricity was strong. In a regression model glucose mg/dl, $Y = 99 + 0.78 \text{ mg/dl per millivolt (pk-pk impulses)}$ measured from internal wiring; the $R^2 = 0.75$ to 0.83 indicate that electricity accounted for 75-83 percent of the variation in blood glucose over the range of 0 to 70 millivolts (mV).

Similarly, persons living near electrical transmission lines had significantly more cases of Type II diabetes than persons living farther from the transmission lines in Australia [2]. Results indicated that the average and the mean time-integrated magnetic field exposure (mGauss-hour) ranged from 6.4 at the lowest to 307.6 mG-h at the highest exposures in the two or three rooms in which occupants spent one hour or more per day on average. In addition:

- Chronic illnesses and asthma were also linearly related to the flux density of magnetic field exposure, mG-h. The report contained results from 112 subjects in each exposure category, 560 total [2].

¹*Shocking News* (dba) is a registered publisher of science-based information dedicated to public awareness of electric and magnetic fields (EMF) in the living environment and their effects on the health and welfare of humans and animals. Editor is Don Hillman Ph.D., Professor Emeritus, Department of Animal Science, with help from his wife Mary, MS, Michigan State University, East Lansing, MI. Member of The American Society of Agricultural Engineers, and The American Dairy Science Association. Telephone (517) 351-9561.

- These diabetes findings correspond with reports that insulin secretion from pancreatic cells of laboratory animals was reduced by exposure to EMF in three of four reports [15].

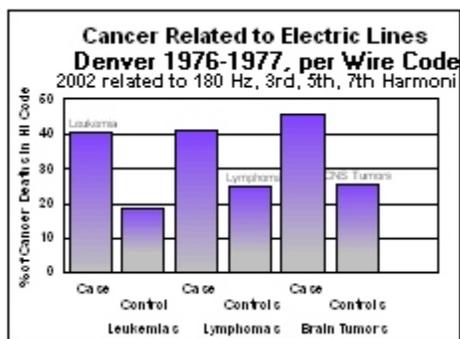
Childhood leukemia, brain tumors, and non-Hodgkin's lymphoma are among the diseases that epidemiological studies have repeatedly associated with excess exposure to EMF in the environment where cancer victims lived and worked. The most notorious was the study of the incidence of cancers among persons living near high current code (HCC) wires (overhead transmission lines) compared to controls who lived near low-current-code (LCC) distribution lines in Denver, Colorado [20]. The conclusion that cancer deaths were higher among victims who lived near HCC power lines has been repeated in three subsequent experiments in the Denver area. The most recent, 2002, "Back to Denver" (BTD) investigation is explained in detail below [11].

Back to Denver (BTD) Study – Electrical engineers and epidemiologists re-examined the EMF-cancer hypothesis by measuring the current (amperes) at the utility neutral-to-ground wire at the transformer or pole near the homes, the amperage on water lines serving the homes, and the intensity of magnetic fields in the living areas most occupied by victims who had lived in the homes. BTD sampled 81 of the 579 cases (cancer) and control residences that were coded by Wertheimer and Leeper in 1979 [20] and by Savitz et al. in 1988 [In ref. 11]. In this study 60 Hz, 180 Hz, and harmonic magnetic fields are associated with wire codes, but only **180 Hz and harmonic magnetic fields are associated with case/control status; case being a cancer victim lived at the residence.**

The odds ratio (OR) combined across strata (HCC, LCC) for the 180 Hz and the sum of 3rd, 5th, and 7th harmonic fields were 4.0 and 4.3 respectively. Both were significantly elevated above the null value of 1 ($P = 0.0061$) for either field components.

- The odds ratios indicate cancer deaths were four times more likely among victims who lived in homes with high levels of 180 Hz current or the 3rd, 5th and 7th harmonics than among controls with similar socio-economic backgrounds.
- The conclusions reached 25 years earlier [20] were validated, but an improved measurement instrument with coil sensor signal analyzer (HP Model 3561A) implicated harmonic currents which earlier test meters did not detect. Using the proper equipment is always necessary to get the right answers.

The measured magnetic fields were dichotomized into "low" and "high" categories with the median being the cut-point for



the measured values, i.e., 0.0843, 0.0122, and 0.0141 μT (microTesla) for 60 Hz, 180 Hz, and harmonic magnetic fields, respectively. These may not be comparable to overall averages in the Denver area since they were from selected categories (100 μTesla = 1 Gauss, or 1 μT = 0.01G or 10 milliGauss (mG) flux density of magnetic fields).

Research in the Department of Pediatrics College of Human Medicine, involving Biophysicists, and Electrical Engineers at Michigan State University, revealed that 60 Hz ELF- EMF exposure resulted in a dose dependent inhibition of differentiation of Friend erythroleukemia cells with maximal inhibition peaking at 40% and 40 mG (4 μT). ELF-EMF at 10 mG (1.0 μT) and 25 mG (2.5 μT) inhibited differentiation at 0 and 20% respectively. EMF at 1.0 (100) and 10 G (1,000 μT) stimulated cell proliferation 50% above the sham-treated cells. Investigators concluded that the 60 Hz EMF may not cause cancer but proliferated the growth of cancer cells *in vitro* [7].

- Microwave radiation: 2.45 Ghz microwave radiation of mouse-embryo fiberblasts increased TPA transformation of cancer cells compared to previous radiation with X-ray alone. U. Maryland investigators concluded that low level microwave radiation can induce latent transformation damage which can then be revealed by the action of tumor promoters [1].
- This concurs with the inhibitory effect of melatonin on cancer cells, and EMF depression of melatonin possibly allowing proliferation of breast cancer cells in National Health Environmental Lab-EPA and Lawrence Berkeley National Lab, U. California as reported at 18th Annual Meeting of the Bioelectromagnetics Society, Victoria, Canada, in 1996.
- In England, intensities of electric fields were significantly higher, 13.6 V/m in the bedplaces of children diagnosed with leukemia, than for controls 7.26 V/m, with chronic night time exposure above 20 V/m giving a five fold increased risk of leukemia [8].
- Higher risk of cancer among electrical workers in relation to EMF exposure on the job further implicates EMF proliferation of cancer [12,14,16,19] and suicide [13,17].
- Dairy cattle exposed to 1.98 to 3.28 μTesla magnetic fields, housed 7 meters under a 330 kV transmission line in Italy had significantly different absolute numbers and percentages of leucocyte sub-populations than control cows remote from the transmission line (0.2-0.7 μT). The difference in CD4+ and CD8+ populations were remarkable [6].
- Canadian cows exposed to 10 kV/m and 30 μT , 60 Hz EMF produced 5% less milk, 16% less milk-fat, and consumed 5% more feed (dry matter) than control cows not exposed. during a 28-day trial. The EMF exposure was equivalent to standing under a 735 kV AC transmission line [4]. Melatonin decreased in blood serum, progesterone increased in lactating pregnant cows, length of estrus cycle increased, Insulin-like growth factor (IGF-1) increased in blood, growth hormone (GH) was increased during part of the nocturnal cycle, macro and trace element changes occurred in blood: Ca, Mg, Fe, and

Cu. Cerebrospinal fluid (CFS) concentrations of Ca, P, Mg, Mn, and Na were different in EMF than control cows. Quinolinic acid increased and tryptophan tended to increase in CFS. CSF changes were consistent with weakening of the blood-brain barrier [3].

- Melatonin has strong oncostatic, immunological, and antioxidant properties. It normally follows the nocturnal pattern of low secretion during daylight and high secretion during darkness. Modification of melatonin nocturnal secretion is believed to be associated with disturbed sleep patterns of humans.
- Human Melatonin, and its urinary metabolite, decreases in relation to EMF exposure of electrical workers in substations or on 3-phase conductors more than 2-hours per day, electric train operators, office workers using Visual Display Units (computer monitors), and cellular telephone users who use the phone more than 25 minutes per day [5]. Melatonin in breast milk follows the nocturnal cycle of blood and urine.
- Serotonin neurotransmitter receptors in the brain are modified by ELF-EMF pulsed (10-20 Hz) transcranial magnetic stimulation, and moods of mental patients are changed by radiation of different cranial lobes, as were β -adrenergic receptors and A_{2A} adenosine receptors in human neutrophils [18].
- Intrajugular injection of serotonin agonist L-tryptophan increased blood growth hormone (GH), thyroid hormones $T_3 + T_4$, and milk production of cows. The pineal and pituitary glands located in the hypothalamus are mediators of environmental stimuli and body functions.

Harmonics are not limited to high or low current neutrals.

- Intensity of magnetic fields was higher for the 60 Hz, than for the 180 Hz and 3rd, 5th, and 7th harmonics. However, the greater severity of magnetic fields in relation to cancer corresponds to observations that body impedance of electrical current decreases and current passing through the body increases as frequency increases. Harmonics are multiples of 60 Hz frequency.

Ground Currents in Residential Water Pipes (24-h currents of 74 Denver homes) were correlated with average spot magnetic field measures in the living areas of cancer victims. Twenty-two homes had an average current less than 0.1 A (ampere), 34 had average currents between 0.1 and 1.0 A, and 18 had average currents over 1.0 A. Water pipe currents were lowest in homes with underground wiring and appeared to be similar in all homes with overhead wiring regardless of wire code.

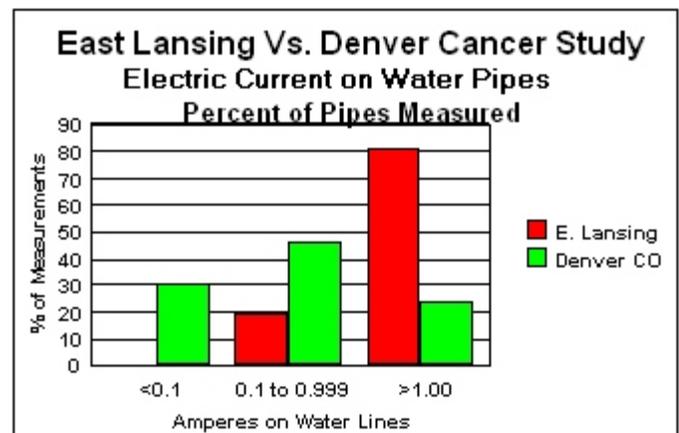
- The similarity of average current carried on LCC and HCC water pipes is not surprising since nearly all primary (utility) neutrals are grounded to the water system in a grounded-Y distribution system used by Consumers Energy and Rural Electric Cooperatives (REA) throughout the country.
- Current on water pipes is from the utility neutral-to-ground. Its bonding to water pipes and to the common secondary neutral in the fuse box or circuit breaker panel

distributes primary neutral current throughout the building and premises.

- Harmonics are produced from nonlinear loads in primary neutral lines by capacitor switching, in secondary (users) non-linear loads produced by switch mode electronic devices, converters, and rectifiers which change alternating current (AC) to direct current (DC), and DC to AC, at various frequencies as required for the particular use.
- The transformer packs that are plugged into the wall outlet, or concealed inside of computers, monitors, printers, and copy machines, variable speed motors, battery chargers, television, computer games, ballasts in some halogen lights, dimmer switches, MRI, and hundreds of electronic control systems may permeate the living environment with EMF. All produce harmonics which return exclusively on the neutral conductor and are transferred to water lines via bonding.
- Non-linear loads produced on single-phase lines are combined in the neutral conductor of a three-phase line and form triplen harmonics (odd-numbered multiples of the 3rd harmonic, i.e., 3rd, 9th, 15th, 21st, etc.). Thus, sharing of the common neutral by single phase and 3-phase lines assures distribution of the harmonics to all users.
- Odd numbered, 3rd, 5th, and 7th harmonics, and triplens measured from step potential electrodes grouted into the floor (distance between front and rear feet) in cow-stalls, were negatively correlated with milk production of dairy cows in a study of problem herds in Michigan, Wisconsin, and Minnesota [10].

In East Lansing, Michigan measures of electricity in six homes, a school, and the Nextel cell-phone generator/antenna installed on the city water tower was revealing.

- Current on water pipes in homes-school averaged 1.63 A, and ranged from 0.35 to 4.0 A (Figure below).



- *OSHA Directive CPL 2-1.18A - Enforcement of the Electric Power Generation, Transmission, and Distribution Standard, Effective Date: October 20, 1997*, states as follows: "Hazardous energy means a voltage at which there is sufficient energy to cause injury.

- If no precautions are taken to protect employees from hazards associated with involuntary reactions from shock, a hazard is presumed to exist if the induced current is sufficient to pass a current of 1 milliampere through a 500 ohm resistor. (The 500 ohm resistor represents the resistance of an employee. The 1 milliamp current is the threshold of perception). If employees are protected from injury due to involuntary reactions from electric shock, a hazard is presumed to exist if the resultant current would be more than 6 milliamperes (the let go threshold for women).”
- OSHA may have underestimated the risk, because **resistances from current greater than 60 Hz frequency are lower (175-200 ohm) and amperage passing through the body is higher than at 60 Hz with the same voltage.**
- Current on exposed water pipes and faucets in the East Lansing environment averaged 1,630 milliampere. More than 1600 times perception level, and 272 times the 6 mA let go threshold for women defined by OSHA.
- The Frequency Spectrum revealed that 3rd, 5th, and 7th harmonics were abundant on the neutral-to-ground conductor of the Nextel cell phone signal generator, on electrical neutrals of electrical outlets, and on water pipes of East Lansing homes, and STA school, as well as a dozen other RF, VHF, and UHF signals to 1.2 GHz which contributed to the high Total Harmonic Distortion (THD) exceeding IEEE THD Standards, and excess amperage on these conductors.
- The high current and high frequency harmonics suggest that East Lansing residents and school children are at extraordinary risk for cancer because of the uncontrolled electricity found in the homes and school that are greater than in the high risk homes in Denver.
- Mitigation procedures are under consideration by the utilities, city officials, and concerned parties.

Possible mitigation procedures for electrical pollution include:

- Utility install a conductor sufficient to return current to the substation without grounding on the water lines.
- Install a “shielded” neutral isolation transformer, between utility and users to prevent transfer of harmonics.
- Install microsurge filters in wall outlets to remove the high frequency current from the electrical system.
- Educate users about high EMF radiation from certain types of equipment and avoid prolonged close proximity exposure to such equipment.
- Public Service Commission establish preliminary Standards for reasonable levels of EMF emission, enforced by Federal and State law.

Professional Offices using modern electronic technology may want a professional assessment of the EMF environment from their power supplier, equipment and instrument manufacturers, or electrical environment specialists. EMF could affect physiological readings and diagnosis of patients, i.e., blood pressure and blood glucose during office visits. Hospitals and

electronics manufacturers have stricter IEEE electrical wiring requirements to protect instrument integrity than other locations. EMF test meters are available from electronics stores.

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