

Appendix B

State of the Science of Electromagnetic Fields and Adverse Health Consequences to Public Health

The National Institute of Environmental Health Sciences reported in 1999 that a comprehensive review of epidemiologic studies of ELF-EMF and cancer support a finding of Group 2B (possible carcinogen) using the World Health Organization International Agency for Research on Cancer (IARC) criteria for carcinogenicity. [See National Institute of Environmental Health Sciences (NIEHS). NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic fields. NIH Publication No. 99-4493, 1999, available from NIEHS P. O. Box 12233, Research Triangle Park, NC 27709.]

The World Health Organization has concluded that ELF-EMF is a Group 2B carcinogen (possible carcinogen) and has published a monograph indicating that exposure to electric and magnetic fields at extra-low power frequencies (50–60 Hz) should be considered possibly carcinogenic (IARC, 2001).

A previous review of the international scientific literature on electric and magnetic fields published between 1979 and 1996, reporting epidemiologic bioeffects of ELF-EMF, showed that approximately 90% of all 46 residential studies and 88% of all 96 occupational studies reported positive risk ratios for cancer and pregnancy outcome (Sage, 1996).

The majority of these studies and reviews have concentrated on magnetic-field effects (as opposed to electric-field effects). However, it should be noted that the electric field is always present where there is electricity but the magnetic field is present only when the light is turned on, electric current is being conducted and electrons actually flow. The magnetic field is a part-time complement of electricity and occurs only when electricity is actually being used at the load end (the light, the oven, the air conditioner, etc). The electric field is present regardless of whether or not electricity is flowing (being used up at a load end). The consequence is that many studies that examine only end measurements of exposure to the magnetic field will overlook the presence (and possible bioactivity) of the electric field in producing disease. The few studies looking solely at electric-field exposure, or the presence of electricity report clear association to human disease.

REFERENCES

- IARC. Static and Extremely Low Frequency Electric and Magnetic Fields: Monographs of the International Agency for Research on Cancer (IARC), vol. 80 (Lyon, France: IARC, June 19–26, 2001; updated March 2002).
- Sage CL. Epidemiology for Decisionmakers: A Visual Guide to the Residential and Occupational EMF Studies (1979–1998). Bioelectromagnetics Society Annual Meeting, 1996.

Appendix C

Individual Case Reports

(not published in the *Journal of Alternative and Complementary Medicine* article)

The following subjective data was taken from each participant in the study – pre, and post-study:

Subject 1

Female – age 24 – Menstrual cycle regular

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Pre-study Complaints

- Long time to fall asleep, wake up after several hours and can't sleep again; wake up exhausted
- Daily headaches
- Migraine one week before periods for last 4 years
- Hip misaligned since childbirth 2 years ago
- PMS: cramps, mood swings, bloating, irritability, depression, weight gain, easily upset, hot flashes
- Digestion: bloating, nausea, diarrhea, gas, constipation

Post-study Report

- “Decreased time to go to sleep”
- “Able to fall back asleep after waking up”
- “Wake up refreshed instead of exhausted”
- “No more daily headaches”
- “Re: PMS – decreased food cravings, bloating, depression and hot flashes”
- “No more nightmares”
- “Digestion improved – less bloating, constipation and nausea”

Additional End-of-study Comments:

“By the third night [on the mattress pad] I slept through the night and it did not take me as long to go to sleep. I've had trouble sleeping for 17 years and was constantly waking up through the night...and now if I do wake up in the middle of the night it is because my son has woken me and even after that it only takes me a few minutes to go back to sleep. In the morning, I feel extremely refreshed and ready to start my day...I wouldn't want to give my mattress pad up for anything.”

Subject 2

Female – age 53 – Post Menopausal

Pre-study Complaints

- Difficulty going to sleep
- Wake up 2-3 times a night for last 3 years
- Whiplash (cervical sprain 24 years ago, re-injured 2 months ago)
- Muscle cramps in legs
- Chronic muscle pain through-out body (myofacial)
- Hot flashes

Post-study Report

- “Fall asleep faster and easier”
- “My neck pain is lessened”
- “My leg and foot cramps have lessened”
- “Helped my chronic pain be greatly reduced”
- “Arm and lower back pain gone”
- “TMJ problem significantly improved”
- “Reduction in hot flashes”

Additional End-of-study Comments:

“Before using the mattress pad, I had a chronic pain in my left upper arm and lower back which were both totally gone the very first week and have not returned.”

Subject 3

Female – age 50 – Menstrual cycle regular

Pre-Study Complaints

- Trouble falling asleep since childhood
- Trouble waking up from deep sleep
- Fatigued
- Muscle aches and leg cramps – many years
- Lower back pain and intestinal pressure due to uterine fibroids
- PMS: fibrocystic breast tenderness, bloating, cramps, irritability, mood swings, easily upset, food cravings
- Night sweats
- TMJ causing occasional headaches

Post-study Report

- “Less stress about going to sleep after a lifetime’s worth of sleep disorders”
- “Somewhat less trouble falling asleep”
- “Have gradually woken up feeling more refreshed in the morning whereas I almost always felt fatigued upon arising”
- “Don’t need coffee in the morning to get going”
- “Leg cramps almost completely gone”
- “Less backache and pain”
- “Less PMS and even less fibrocystic”; “Less cramps and irritability with PMS”

- "More even-tempered"
- "TMJ greatly reduced"

Additional End-of-study Comments

"I've definitely had a greater sense of well-being and feel a subtle sense of lightness and ease. A low-grade, background feeling of stress that I've always had seems to be diminished."

Subject 4

Female – age 42 – Menstrual cycle regular

Pre-Study Complaints

- Trouble falling asleep
- Waking feeling tired; Trouble waking up from nap
- Light, restless sleep
- Fibromyalgia since 1992 car accident; a lot of joint pain – arms, legs, ankles
- Gastrointestinal upset – gas

Post-study Report

- "The general quality of my sleep improved – not immediate, but a gradual change"
- "Sleeping much deeper"
- "A lot less fatigue because of less pain"
- "My fibromyalgia has improved considerably because of diminished pain and fatigue"; "The joint pain is gone with occasional pain in the left arm"
- "I am feeling much better, I haven't been sick at all."

Additional End-of-study Comments

"I think the mattress pad is extremely beneficial and I hesitate to sleep on anything else."

Subject 5

Female – age 51 – Post Menopausal (last period one year ago)

Pre-Study Complaints

- Some trouble falling asleep
- Wake up from hip pain; also wake up from a hot flash between 4 and 5 AM
- Wake up with a headache every morning (last 3 months)
- Wake up feeling groggy (last 3 months)
- Wake up tired
- Hot flashes all day (for one year) as well as during sleep
- Hip pain, possible arthritis (1-2 years)

Post-study Report

- "Disappointed that I did not sleep any better"
- "Less occurrence of hot flashes"

Additional End-of-study Comments

"No significant change except for decrease in daytime hot flashes."

Subject 6

Female – age 52 – Post Menopausal

Pre-Study Complaints

- Sleep very lightly
- Wake up feeling tense several times during the night
- Wake up feeling tired in morning
- Feel tired during day
- Pain in left hip, sporadic for several years (began few years ago)
- Allergies (food and airborne) since age 13
- Digestion: gas

Post-study Report

- “Have felt more rested and feel like I need an hour less sleep per night”
- “Deeper relaxation”
- “Stopped having any pain at all in my left hip”
- “First few days, I experienced tingling and heat in areas of my previous physical injuries – similar to an acupuncture treatment. After approx. 3 days, these vague feelings subsided”
- “Allergies have definitely lessened”
- “Better digestion”
- “I noticed that I stopped clenching my jaw at night”

Additional End-of-study Comments

“It’s getting back into the rhythm of the earth.”

“My husband, not part of this study, [but sleeping on the mattress pad] began sleeping fewer hours, has more energy, and has stopped snoring.”

Subject 7

Female – age 44 – Menstrual cycle regular, periods heavy

Pre-Study Complaints

- Trouble sleeping
- Wake up 2-3 times each night with physical discomfort
- Anemic one year
- Less energy than in past
- Numb fingers left hand 4 months, carpal tunnel

- PMS: bad cramps, painful heavy periods and uterine fibroids many years, breast tenderness, mood swings, weight gain
- Hot flashes at night [or may be night sweats]
- History of anxiety attacks

Post-study Report

- “Gradually sleeping better”

- "Two episodes of waking up between 4:30 AM and 5:30 AM with anxiety that subsides by early afternoon.
- "Less numbness in hand and fingers, especially at night; not needing to wearing a brace at night"
- "Menstrual period not as severe; cramps not as strong"
- "Feeling better physically and emotionally"

Additional End-of-study Comments

"My experience has been strange. I don't know what to think."

Subject 8

Female – age 31 – Irregular menstrual cycle; period ceased for one year and restarted 3 weeks prior to study start date, then ceased again during study

Pre-Study Complaints

- Problems getting to sleep
- Trouble sleeping, discomfort from neck, toss and turn till 3:00 a.m.
- Feel unrested in the morning
- PMS: bloating, breast tenderness, weight gain, acne (during menstrual periods)
- Allergic to some foods (last 2 years)
- Digestive problems: gas, constipation, bloating, heartburn

Post-study Report

- "At first my body responded quickly by feeling completely relaxed. But due to stress (planning my wedding) I went through several weeks of soreness in my neck. But I've noticed I sleep a lot more comfortably overall than I have in the past couple of years."
- "Deeper relaxation once I get to sleep."
- "Digestive system is getting better...less stomach pain and bloating."

Additional End-of-study Comments

"My overall experience has been very positive"

Subject 9

Male – age 72

Pre-Study Complaints

- Trouble falling asleep
- Wakes up during the night
- Don't want to wake up in morning
- No significant pain
- Some depression since surgery (aortic aneurysm ruptured 2 ½ years ago)
- Digestion: gas, diarrhea

Post-study Report

- "Falling to sleep more quickly"
- "Falling to sleep more quickly after going to the bathroom at night"
- "Sleep is deeper"

- "Dreams more vivid"
- "Feeling somewhat more refreshed upon awakening"
- "Stress and tension is improving"
- "No more pain"
- "Digestion is better"

Additional End-of-study Comments

"The mattress pad is a very good health aid by helping you sleep deeper and relaxing you from stress and tension."

Subject 10

Male – age 37

Pre-Study Complaints

- No problem going to sleep but sleep is not as deep as it should be
- Wake up not feeling rested (4 years)
- Sleep 7 hours at night. Need 2-3 hours more
- Wake up feeling achy in back
- Knee, joint, ligament problems – knee goes out of joint (several years)
- Skin irritation/fever blisters

Post-study Report

- "My overall experience was impressive. I felt from the very first time a very relaxing effect. It is like you lay down and don't want to move."
- "Definitely slept better"
- "Woke up in a better physical and psychological state"
- "Felt calmer and with better mood"
- "Felt more centered and patient"
- "Felt more relaxed"

Additional End-of-study Comments

"I felt the physical effect of the pad, but I also felt the soothing psychological and spiritual effect of being connected to Mother Earth. It's like sleeping on your mother's lap again."

Subject 11

Male – age 50

Pre-Study Complaints

- Sleep deeply 4 hours and then sleep is not restful
- Get fatigued during the day (several years)
- Arthritis (several years); achy joints
- Leg cramps
- Tore rotor cuff (one year ago) – almost better
- Bone spur on left heel (started months ago)
- Digestion: acid stomach problems, heartburn and gas

Post-study Report

- "Better sleep. I hardly wake up from early morning dreams where I used to wake up every night."
- "I wake up more refreshed and my aching joints are almost gone"
- "Less body pain in the morning"
- "Feeling better the rest of the day"
- "My shoulder and heel have almost completely healed"
- "Leg cramps are much less frequent"
- "Stomach reflux has disappeared"

Additional End-of-study Comments

"Something definitely worth trying if you are having problems with sleeping."

Subject 12

Male -- age 39

Pre-Study Complaints

- Trouble falling asleep
- Wake up all through the night for a few minutes [subject reports his four dogs wake him up by barking frequently]. Trouble getting back to sleep.
- Sometimes wake up from shoulder and back pain
- Tired in the day
- Occasional headaches
- Occasional sore muscles in shoulders and back from basketball or heavy lifting
- Some back and hip pain
- Digestion: gas and heartburn

Post-study Report

- "Fall asleep quicker"
- "Seem to sleep deeper"
- "No trouble falling back to sleep"
- "In the morning I do not want to get out of bed"
- "No shoulder pain"
- "Less headaches"
- "Digestion/heartburn less"

Additional End-of-study Comments

"Sleep was better"