# Prenatal Exposure to Weak Magnetic Fields Leads to Childhood Asthma

## First Prospective EMF Epidemiological Study Ever Done

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A mother's exposure to weak power-frequency magnetic fields during pregnancy substantially increases the chances her child will develop asthma, according to a new study by De-Kun Li and coworkers at Kaiser Permanente in Oakland, CA. An average magnetic field exposure of just 2 mG (0.2 μT) during pregnancy more than triples the child's risk of getting asthma by the age of 13, they report in a paper released today by the *Archives of Pediatrics & Adolescent Medicine,* a publication of the American Medical Association (AMA).

"It's a very provocative finding that needs replication," Jonathan Samet told *Microwave News.* Samet, an epidemiologist at the University of Southern California (USC) and a member of the National Cancer Advisory Board, served as the chair of the IARC panel that in May classified cell phone radiation as a possible human carcinogen.

If Li's findings are confirmed, they would have enormous implications for public health. Asthma, inflammation of the airways to the lungs, leads to shortness of breath, wheezing and coughing. It is the most common chronic disease among American children. Ten percent of school-aged children have asthma. Over the last few decades, the incidence of childhood asthma has jumped from a rate of 2.9% among those under 18 in 1980 to 6.7% in 2004, according to the U.S. Centers for Disease Control (CDC).

Li's study is the first prospective epidemiological study ever carried out on any group exposed to any type of electromagnetic fields (EMFs). The mothers' magnetic field exposures were measured during the first or second trimester and the health of their children —a total of 626 boys and girls— was followed for the next 13 years.

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Li sees a clear dose-response: Every 1 mG increase in median magnetic field exposure during pregnancy led to a 15% increase in asthma in the offspring. The trend is highly significant.

The observed association is supported, according to Li, by the additional finding that the observed effect of magnetic field exposure got stronger when combined with two known risk factors for asthma. For one, if the mother herself has asthma, the chances her exposed child also gets asthma doubles again, to an overall sixfold increased risk. "The fetus of a mother with a history of asthma is especially vulnerable to magnetic field exposures," Li told *Microwave News.* And first-born children, who have been shown to have higher risks of developing asthma, were found to be at even greater risk when their mothers were exposed, on average, to more than 2 mG.

The mothers wore an EMDEX-II meter —which measures magnetic fields in the 40-800 Hz frequency range— for 24 hours and they were later asked if that day was similar to or different from a typical day of their pregnancy. The observed association among their children emerges as significant for those who said it was a typical day. In an interview, Li asserted that limiting the measurements to a single day did not weaken his study. "Had we measured the magnetic fields every day, the association would have been even stronger," he said.

This new prospective study comes on the heels of last week's confusing retrospective study on tumor risks among young cell phone users. One of that study's principal investigators, Martin Röösli, among others, is now saying that he is convinced that there's no point doing any more retrospective epidemiology.

Li has come to the same conclusion. "We should stop conducting retrospective case-control studies for EMF effects," he told us. "These studies just add noise rather than providing valid evidence to clarify issues," adding that, "EMF exposure simply can't be reliably assessed retrospectively." As for prospective studies like his own, Li said: "Yes, they are hard to conduct and take a long time to complete. But we have to start somewhere."

### What's Next?

Chronic exposures of 2 mG or more have long been associated with childhood leukemia. That link was first demonstrated by Nancy Wertheimer and Ed Leeper more than 30 years ago, and, though confirmed by a large number of subsequent epidemiological studies, it continues to be treated with skepticism, especially by physicists. What's missing, they say, is a theory that can explain how weak fields can cause cancer. Without a mechanism of interaction, standard-setting groups have ignored the leukemia risk. Exposure limits for children remain close to a thousand times higher than the 2 mG threshold.

On the other hand, those who acknowledge the leukemia link have been asking: If weak magnetic fields can lead to childhood cancer, what else might they be doing? Li's study may be a first step in answering that question. Yet, past experience tells us that nothing

much will happen until his study is repeated. (Li himself concedes that his "findings need to be replicated.") And if someone were to secure the money for another prospective study —a dubious proposition in these days of tight budgets— we would have to wait another 15 years for possible confirmation.

Even then, the mechanism for the asthma effect would be demanded. Li offers a suggestion: "Prenatal exposure to high magnetic field levels could interfere with the development of both epithelial cells and normal immune systems," but quickly adds that working out the mechanism will require research by multidisciplinary collaborations.

"Childhood asthma has genetic and environmental determinants and any mechanistic basis for the observed association is highly speculative based on current understanding," says USC's Samet. "In this instance, more research is definitely needed."

Ten years ago, Li published another notable study which showed that women exposed above a magnetic field of 16 mG or more during pregnancy, were at a higher risk of having a miscarriage. "We are entering a new chapter in the field of EMF epidemiology," Li told us at the time. "There is more evidence that there is an association —the better-conducted studies consistently show an association" (see *MWN,* M/J01, p.1). No one ever followed up and his 2002 paper is all but forgotten.

*ELF EMFs, pregnancy, asthma, De-Kun Li, Kaiser Permanente, IARC, Jonathan Samet, childhood leukemia, Nancy Wertheimer, Ed Leeper,*

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