

Fickle fields: EMFs and epidemiology

The inexact science of epidemiology once again has tangled with the fickle phenomenon of electromagnetic fields (EMFs) as researchers try to gain a clearer picture of whether living near power lines and using electric appliances may increase the risk of cancer. A new EMF study—involving more people and more reliable exposure estimates than any such effort in the past—indicates that the risk of childhood leukemia correlates with the location of power lines, but not with the measured strength of electric and magnetic fields.

Researchers at the University of Southern California in Los Angeles examined the arrangement of power lines near residences and used this information to estimate children's EMF exposures. They based their exposure estimates on a controversial model developed for a study conducted in Denver in 1979 (SN: 4/21/79, p.263). In the Denver wiring model, underground power lines receive the lowest exposure rating, while certain aboveground configurations receive the highest rating.

Of the four studies that have used the Denver model so far, this is the third to suggest a link between childhood leukemia and power lines.

The new study is the first, however, to take 24-hour measurements of EMFs inside children's bedrooms, in addition to EMF measurements around the home. The investigators were surprised to find "no consistent association" between leukemia risk and these direct measurements, says principal author Stephanie J. London. This finding hints at the potential importance of other EMF factors, such as the field's direction, frequency and degree of fluctuation, she suggests.

Focusing solely on EMF magnitude, she says, is "sort of like going to the symphony and grading it just on how loud the music was."

London's team directly measured EMF strength in and around the Los Angeles County homes of 164 children with leukemia and 144 healthy children, finding no correlation with leukemia risk. But when they used the Denver wiring model to assess EMF exposures in an expanded sample of 219 children with leukemia and 207 healthy children, they found that the children with the highest estimated exposures had double the leukemia incidence seen in children with the lowest estimated exposures, the group reports in the Nov. 1 *AMERICAN JOURNAL OF EPIDEMIOLOGY*.

A number of epidemiologic studies have turned up statistical links between EMF exposure and various cancers, although scientists have yet to establish whether EMFs actually have any health

effects (SN: 9/28/91, p.202). David Savitz of the University of North Carolina in Chapel Hill says the new findings add to the evidence suggesting that EMFs cause cancer.

They also dovetail with a Denver study he led in 1986, he notes. London's study "remedied some of the deficiencies that were in our study and found a surprisingly similar pattern of results," Savitz says. "The inherent association with wiring configuration seems to remain."

London emphasizes that her study—funded by the Electric Power Research Institute, the research arm of the electric industry—is far from conclusive. The observed association could stem from unidentified leukemia risk factors, possibly related to lifestyle or educational level, she points out. In general, families living in neighborhoods with underground power lines are more affluent than those living near aboveground power lines, she says.

London also notes that the Denver model may not reflect the wiring configurations used in Los Angeles. She hopes to develop a southern California wiring model to use in further investigations. If such investigations show a weaker association between power lines and leukemia, she says, they will cast doubt on the validity of the recent findings.

Her team also analyzed data from questionnaires asking parents if their child had routinely come in contact with any of 15 household appliances. For two of these items—electric hair dryers and black-and-white televisions—the researchers found a statistically significant association with leukemia incidence. Hair dryers produce substantial EMFs, and thus could be an important contributor to EMF exposure in the home, London says.

Last year, however, in the only other EMF study to investigate that appliance, Savitz found no association between hair dryers and childhood leukemia. His study did not include televisions.

London notes that parents of seriously ill children, compared with parents of healthy children, may recall more details about potentially risky exposures in the child's past—a tendency that could skew research findings.

Without any solid evidence that EMFs contribute to cancer risk, London discourages people from tossing out their hair dryers just yet. "There are so many public health messages that people get that can change every week because they're not based on solid science," she says. "I think this [appliance-leukemia correlation] is one of those."

— K. Schmidt

Forgotten fossils reveal leggy legacy

Paleontologists normally discover fossil treasures while chipping at rock, but some of their best finds pop up during searches through old museum drawers. After sifting through the collections of several British museums, one researcher has identified the remains of the earliest footed animal, documenting a critical step in the evolutionary journey our ancestors took as they left the oceans for the land.

All of the rediscovered bones originally came from a Scottish site dating back to the Frasnian stage of the late Devonian period, about 370 million years ago. In the past, scientists who examined some of these specimens had identified them as fish remains. But in the Nov. 28 *NATURE*, Per E. Ahlberg of the University of Oxford says the bones have characteristics linked to the tetrapods, or four-footed animals. Scientists believe tetrapods evolved from fish with lobed fins and were the first vertebrates to crawl onto land.

Ahlberg describes one of the fossil bones as a tibia (leg bone) that "represents the earliest known tetrapod-type hindlimb." This find pushes back the origin of tetrapods by about 10 million years.

Ahlberg has also identified a humerus and jaw fragments from tetrapods or their close relatives.

Scientists cannot tell whether all of the bones came from the same type of animal, but if one creature did wear these different parts, it might have looked like a cross between a fish and a tetrapod, says paleontologist Jennifer A. Clack, who studies early tetrapod evolution at the University of Cambridge in England. While the tibia clearly belongs to a leg, the humerus preserves some fish-like characteristics and may have formed part of a fin, suggesting this animal had feet in back and fins in front. In her studies of the next-oldest tetrapod, an animal from Greenland, Clack has found a similar mosaic of fish and tetrapod traits.

"What seems to be happening is that the boundary between fish and tetrapods is becoming rather blurred," she told *SCIENCE NEWS*.

Because they display a mixture of characteristics, the Greenland and Scottish finds support the idea that the tetrapods' fishy forebears developed legs for some purpose other than walking on land. Clack says legged fish may have used discrete, toe-like digits to grasp vegetation while waiting to ambush their prey. That hypothesis challenges the standard theory that legs evolved from fins when fish began dragging themselves between pools of water separated by dry land.

— R. Monastersky