duct cases and is an advocate of tackling such problems aggressively. She adds: "You just can't afford to write rules in a cooperative community—where the foundation must be trust—for the bad actors."

Varmus—who runs his own lab while heading NIH—says he would "take issue" with the idea that an institute chief is at greater risk of getting snared in a fraud case than the head of a large academic center or department, or any other person leading a large scientific project. Like Gunsalus, Varmus thinks it is hard to guard against "someone who's very smart and very determined, and who builds a house of cards from which they can't escape." It would be "wrong," Varmus believes, to conclude from this case that "you have to mistrust everything" or require duplication of every significant result in the lab.

As for Collins, he, too, believes it would be "naive" to try to create a "fail-safe mechanism" to prevent fraud. It may be, he says, that deceit and betrayal are part of the price we must pay for a free system. "If [research] is going to be open, if it's going to be creative, if you're going to allow people with talent to explore the unknown," Collins says, "there are going to be people who take advantage" of that freedom and abuse it. He thinks the only remedy may be "to do science with our eyes more open."

–Eliot Marshall

POWER LINES AND HEALTH

Panel Finds EMFs Pose No Threat

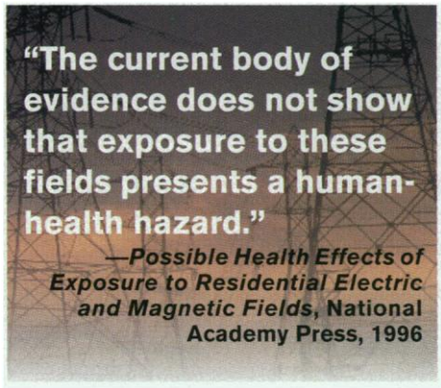
Last week, the National Research Council (NRC) seemed to deal a mortal blow to one of the most polarized and long-running environmental controversies—whether electromagnetic fields (EMFs) from power lines or household appliances pose a threat to human health. After an exhaustive, 3-year study, a 16-member panel said there is "no conclusive and consistent evidence" that ordinary exposure to EMFs causes cancer, neurobehavioral problems, or reproductive and developmental disorders. But this is a debate that won't die easily. And ironically, three panel members may help to keep it alive: In a separate press statement, they said that it's still an open question whether EMFs threaten health.

Public concerns about possible health hazards from EMFs first arose in 1979, when researchers reported that children living close to high-voltage power lines in Denver had elevated rates of leukemia. A blizzard of studies ensued (*Science*, 11 December 1992, p. 1724). Many found no health risks from ordinary EMF exposure, but others linked EMFs to a range of maladies, from miscarriages to breast cancer. To address burgeoning public fears and help decide whether protective regulations were in order, the Department of Energy (DOE) in 1993, at Congress's request, commissioned the NRC report.

After reviewing more than 500 studies, the panel concurred that at very high doses, EMFs can have biological effects. These include disruption of chemical signaling between cells in cultures, and inhibition of melatonin production and promotion of bone healing in animals. But the panel found no adverse effects on cells or animals at the low levels measured in residences.

The committee also found epidemiological studies linking ordinary EMF exposure to adult cancer and other health problems unpersuasive "in the aggregate." For example, a few studies have suggested that EMFs from electric blankets and video display terminals can harm the developing fetus, and research on workers in electrical jobs has found elevated rates of brain, breast, and other cancers. But the panel said the results are inconsistent and difficult to interpret.

Nonetheless the panel thought the childhood leukemia link merited further investigation, so the members did a meta-analysis of 12 studies from the United States and Europe. While they found a 1.5-fold increase in the cancer rates in homes with a high "wire code"—an estimate of household EMFs based in part on the distance to high-voltage power lines—they also found that wire code values are not a good indicator of actual fields in the home. Moreover, the panel noted that researchers have failed to find a correlation between actual EMF measurements in the home and childhood leukemia.



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The panel suggested that the leukemia link may be due to some other factor, air pollution, for example, since high wire code homes tend to be on heavily trafficked streets. The panel's chair, Charles Stevens of the Salk Institute in La Jolla, California, says more research is needed to pinpoint what—if not EMFs—may be causing the elevated rates of leukemia. But overall, the report concludes, "The current body of evidence does not show that exposure to these fields presents a human-health hazard." The report is "an enormous step forward," says Robert Park of the American Physical Society, which issued a report last year that also concluded EMFs do not threaten health.

Though all NRC panel members signed the report, three took the unusual step of releasing a separate statement saying that the debate over health effects was far from over. "People may interpret the report [to mean] the matter is settled, but we don't think it is," says epidemiologist Richard Luben of the University of California, Riverside, who was one of the signers. According to the release, issued by the Bioelectromagnetics Society, a scientific organization of 700 EMFs researchers, the panel's most important finding is "a reliable, though low, statistical association between power lines and at least one form of cancer." The release also highlights a statement within the report that says effects from environmental EMFs "cannot be totally discounted" and underscores the panel's call for more research.

Some other EMFs researchers also find the report's tone too dismissive. Neurologist Ross Adey of the Veterans Administration Medical Center in Loma Linda, California, says the summary "does not adequately reflect the body of biological and biomedical knowledge" about EMFs. Adey heads a working group conducting an EMFs study for the National Council on Radiation Protection and Measurements (NCRP), a congressionally chartered advisory group. An earlier, unreviewed draft, which caused a furor when it was leaked to the press last year, concluded that EMFs pose a sufficient threat to warrant regulatory measures. It is now being reviewed by the NCRP council.

Two other groups are also studying the issue. The Environmental Protection Agency (EPA) was leaning toward recommending regulatory measures in a long-delayed report which EPA's Robert McGaughy says was shelved last year, in part for "budgetary reasons." And the National Institute of Environmental Health Sciences, which together with DOE conducts a $65 million EMFs research program, is scheduled to deliver a report to Congress in mid-1988.

But even this string of studies may not lay the controversy to rest. As Dimitrios Trichopoulos, chair of epidemiology at the Harvard School of Public Health, points out, "It's one thing to say, 'Not guilty,' and another to say, 'Innocent.'" For that reason, he predicts, the issue of residential EMFs "will never go away."

–Jocelyn Kaiser