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When Enough Is Never Enough

A Reproducible EMF Effect at 12 mG

It's happened again.

It's not supposed to happen at all. But now it has happened seven times in research labs on three continents.

Even so, the news of the latest replication of a weak, clearly non-thermal, electromagnetic field (EMF) effect was met with silence. No one issued a press release. No one rushed to try to explain "the impossible." No one wondered about the policy implications.

And if Rainer Girgert of Germany's University of Heidelberg, the lead author of this latest replication, meets with the same fate as his six predecessors, he may soon lose his research grants—or perhaps worse, as happened to Robert Liburdy who first saw this same effect years ago.

Writing in the November 4 issue of *Biochemical and Biophysical Research Communications,* Girgert reports that a 12 mG (1.2 μT) magnetic field can block the ability of tamoxifen to control the growth of human breast cancer cells.

For more than 20 years, breast cancer patients have been given tamoxifen after surgery and chemo- and/or radiotherapy to help stave off a recurrence. It is only one of a handful of drugs that is prescribed for preventing breast cancer. Just a few days ago, less than two weeks after Girgert's paper was published, the U.S. National Cancer Institute (NCI) announced that its long-term follow-up study showed beyond reasonable doubt that tamoxifen can indeed prevent breast cancer among women at high risk of developing the disease.

Girgert was working with cells in petri dishes but it's easy to extrapolate his findings to real-world situations. Consider, for instance, what might happen to a recovering breast cancer patient who is taking tamoxifen, if her job forces her to stand in front of an office copying machine all day, or if she sits next to a wall which conceals an electrical transformer or even if she blow dries her hair every morning.

Each day, over one million American women have an average daily magnetic field exposure of over 10 mG. Many more spend an hour or longer in such fields every day.

Liburdy, then at the Lawrence Berkeley National Lab, was the first to show this same EMF effect with both tamoxifen and with melatonin back in the early 1990s (see *MWN,* J/A92). (Melatonin can also keep breast cancer cells in check.) Over the next few years, four other American research groups were able to repeat Liburdy's experiments (see *MWN,* M/A96 and J/A98).

Then in 2001, Masami Ishido at Japan's National Institute for Environmental Studies took Liburdy's discovery a major step forward. After once again showing that breast cancer cells treated with melatonin would resume growing when exposed to power-frequency EMFs, Ishido explained how the

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fields could do this. He found that the magnetic field disrupts the cells' signaling system—their internal communications network, which determines how they respond to their environment.

Ishido had done much more than simply replicate the work of five other labs. He had given credibility to what most others had dismissed as an anomalous experimental finding.

In the process, Ishido also challenged one of the central tenets of mainstream toxicology: Less is better and more is worse. The EMF effect he observed at 12 mG was pretty much the same as the one he saw when he used a *field a hundred times higher*—at 1 G. In some later, as yet unpublished work, Ishido found indications that the effect was even stronger at the lower EMF dose than the higher one.

Ishido may have been uncertain about such an inverted dose-response relationship, but Girgert has no doubts. "Surprisingly, at [1 G] the effect on tamoxifen inhibition was clearly lower than at [100 mG]," he writes in *Biochemical and Biophysical Research Communications*.

"Girgert's paper is very important," says Carl Blackman, a research scientist at the U.S. Environmental Protection Agency (EPA). Blackman, who led one of the four groups that repeated the original Liburdy work with both tamoxifen and melatonin, points out that the Japanese and German work represent more than simple replication. "Ishido extended Liburdy's finding by investigating changes with techniques from molecular biology, while Girgert looked at the effect at different tamoxifen concentrations and EMF exposure levels," he said. "Girgert has filled in some critical missing pieces and the 12 mG effect now rests on a much firmer foundation."

After Ishido's work appeared in 2001, a number of leading melatonin scientists, including David Blask and Richard Stevens, told *Microwave News* that they were now convinced that the 12 mG effect was real and would now be taken seriously (see *MWN*, S/O01).

They were wrong.

For instance, this summer the World Health Organization's EMF project completed what is billed as an exhaustive review of the scientific literature on EMF health and biological effects. The 365-page draft document includes more than 1,000 references—yet, somehow, the papers by Liburdy, Blackman and Ishido documenting the 12 mG effect on melatonin and tamoxifen were all left out.

Nor have any of these three researchers been able to continue their work on EMFs.

In 1999, Liburdy was drummed out of the EMF profession on what many consider to be trumped-up charges of scientific misconduct. (At issue was a set of unrelated experiments.) He settled the case without admitting any "wrongdoing" but was nevertheless barred from receiving federal research funds for three years (see *MWN*, J/A99). Liburdy has, at least for the present, abandoned his career as a research scientist.

Blackman and others at the U.S. EPA are effectively barred from doing any more EMF experiments. EPA managers have made a habit of looking the other way whenever the EMF-health question is raised. No one at the agency need fear Congressional oversight. Many times over the years, the Congress has moved to eliminate any funds targeted for EMF research.

Ishido is in a similar predicament. In a recent e-mail message, Ishido told *Microwave News* that there is "no hope" that his EMF project, which has been stalled for years, will be revived.

Both Liburdy and Blackman have not given up. They are still optimistic that someone will be given the opportunity to get to the bottom of this 12 mG effect. "We were committed to pursuing these findings," Liburdy told us in early November. "The mechanistic research would have been fascinating." Blackman believes that there is more at stake than biophysical theories. "If we understand what's going on here, we might well find better ways to treat breast cancer," he said.

Girgert is their last best hope.