Power-Frequency EMFs Promote Cancer in Massive Animal Study

Italians Call for a "Reevaluation of the Safety of Non-Ionizing Radiation"

February 27, 2016
Last updated May 24, 2016

Once again, power-frequency magnetic fields have been found to act as a cancer promoter.

Eighteen months ago an international team led by Elisabeth Cardis in Spain showed cancer promotion in workers exposed to chemicals and extremely low frequency (ELF) EMFs. Now an Italian team has found essentially the same promotional effect in animals exposed to ionizing radiation and ELF EMFs.

Rats, which received a single low-dose of gamma radiation early in life and were exposed to magnetic fields for their entire lifetime, developed higher than expected rates of three different types of cancer: Breast cancer and leukemia/lymphoma, as well as an extremely rare and obscure tumor, called malignant schwannoma of the heart.

The new study, which was carried out at the Ramazzini Institute in Bologna, Italy, is part of the most ambitious EMF–animal project ever attempted. Future reports from the same group will describe the action of EMFs combined with a number of other cancer agents, specifically formaldehyde and aflatoxin, in addition to EMFs alone. Together, all these experiments involve more than 10,000 rats at a cost in excess of 5 million euros ($5-6 million). The EMF–gamma radiation study had more than 650 exposed rats and 1,001 controls.

"We have confirmed the old epidemiological observations of Milham, Wertheimer and Matanoski regarding the increased risk of lymphoma/leukemia and mammary cancers, as well as the more recent study by Cardis," said Morando Soffritti, the director of the project, in an interview with *Microwave News.* Soffritti was referring

Search

Microwave News The Web

Return to Main Article Archive

VIEW ARTICLES BY YEAR

2026 Articles
2025 Articles
2024 Articles
2023 Articles
2022 Articles
2021 Articles
2020 Articles
2019 Articles
2018 Articles
2017 Articles
2016 Articles
2015 Articles
2014 Articles
2013 Articles
2012 Articles
2011 Articles
2010 Articles
2009 Articles
2008 Articles
2007 Articles
2006 Articles
2005 Articles
2004 Articles

Help Support
Microwave News

to the pioneering work of Sam Milham, Nancy Wertheimer and Geneveive Matanoski from 1979 through the 1990's.

Magnetic fields can "enhance the effects of a well-known carcinogen," said Fiorella Belpoggi, the scientific director of the Institute, in an e-mail exchange. Soffritti, the former scientific director, is now the honorary president of the Institute and continues to work on this and other projects. Their paper will appear in an upcoming issue of the *International Journal of Radiation Biology* and is now posted on the journal's Web site.

The Ramazzini researchers did not mince words about the implications of the new findings. In the "Conclusions" section of their abstract, they wrote just one sentence: "These results call for a reevaluation of the safety of non-ionizing radiation."

The new animal results "lend support to our recent findings on ELF and brain tumor risk," said Cardis of the Center for Research in Environmental Epidemiology (CREAL) in Barcelona. Her project, known as the INTEROCC study, investigated brain cancer among workers exposed to chemicals and EMFs (see our report: "EMF Cancer Promotion: An Old Idea Makes a Strong Comeback").

Soffritti declined to describe the findings of the EMF–formaldehyde animal experiment, saying only that they have found some "very interesting results regarding public health" and that a paper has been submitted to a peer-reviewed journal. A number of other publications, including a commentary, are also in the pipeline. [May 24, 2016 update: The formaldehyde paper has been published. Details here.]

The Ramazzini Experiment

The Ramazzini team followed what is commonly known as an initiation-promotion protocol. Male and female Sprague-Dawley rats were exposed in their mothers' wombs and then for the rest of their lives to 50 Hz magnetic fields at an intensity of either 20μT or 1,000μT (200 mG or 10 G). At the age of six weeks, they each received a single 0.1Gy dose of gamma radiation, a known cancer agent. (They say that such a human exposure to ionizing radiation, from a set of CT scans for example, "cannot be called unusual.")

Here are the key findings in the researchers' own words:

> (a) A significant dose-related increased incidence of mammary adenocarcinomas [breast cancer] in males and females in particular in males exposed to 20μT plus 0.1Gy and in females exposed to 1,000μT plus 0.1 Gy;
>
> (b) In males a significant dose-related increased incidence of heart malignant schwannomas with a significant increase among males exposed to 20μT plus 0.1Gy [statisticallly significant] and to 1,000μT plus 0.1 Gy; and
>
> (c) A significant increased incidence of hematopoietic neoplasias [leukemia and lymphoma] in males treated at 1,000μT plus 0.1 Gy.

The Italian team expressed surprise at the observed excess of breast tumors in male rats. “In our historical controls, mammary cancer in male rats is a very rare tumor,” they wrote.

The link between EMFs and breast cancer in men was first described by Matanoski of Johns Hopkins University more than 25 years ago. Others later reported similar findings (see *MWN,* J/A90, p.1 and *MWN,* M/A91, p.5). A recent meta-analysis of ten studies of male breast cancer and EMFs found support for the association.

Yet, members of the EMF establishment have contested the hypothesis that there may be a link between EMFs and breast cancer, male or female. One notable critic is Maria Feychting of the Karolinska Institute who serves as the vice chair of ICNIRP. She has called for an end of all such studies (see our “The Shrill Cry To Stop EMF Research”). ICNIRP has never accepted the possibility that there may be any type of cancer risk —to the breast, brain or blood— from EMFs or RF radiation.

Some Sordid History on EMFs and the NIEHS

The new support for the hypothesis that EMFs can promote breast cancer in animals is the latest chapter in a long-running drama that pitted the National Institute of Environmental Health Sciences (NIEHS) against a research group at the School of Veterinary Medicine in Hannover, Germany. The German team, led by Wolfgang Löscher and Meike Mevissen, ran a series of animal experiments in the 1990’s which showed that EMFs could promote breast cancer in animals that had been initiated by DMBA, a chemical carcinogen (see, for instance, “Löscher Again Finds EMFs can Promote Breast Cancer,” *MWN,* S/O99, p.4). When an NIEHS-funded team was unable to replicate that work, a senior NIEHS official, Gary Boorman, waged a dirty tricks campaign to discredit the German researchers. Boorman was later disciplined and the NIEHS offered Löscher a formal apology (for more on this fiasco, see our “It’s Genetics, Stupid”). Nevertheless, NIEHS, like ICNIRP, has declined to acknowldge an EMF–cancer risk.

After reviewing the Ramazzini results, we contacted Mevissen, who is now a professor of veterinary pharmacology and toxicology at the University of Bern in Switzerland, for a comment. “The new study indicates that ELF EMFs can promote breast cancer,” she told us. “This and the leukemia findings contribute new pieces of the puzzle supporting the IARC decision of 2001 that ELF EMFs is a possible carcinogen.” Mevissen was a member of the IARC panel that designated power-frequency magnetic fields as a 2B (possible) carcinogen (see *MWN,* J/A01, p.1). Soffritti attended the meeting in Lyon as an observer.

No Cancer Seen with EMFs Alone

In an interview, Belpoggi said that they are planning to publish the results of a concurrent experiment in which rats were exposed to power-frequency EMFs, without any other treatment. “In our preliminary data, ELF EMFs alone didn’t appear to show an increase of cancer in experimental animals so far,” she disclosed. “The main result of our experiment,” she said, is that “ELF EMFs

have a synergistic effect: They are able to enhance the effects of a well-known carcinogen at low doses that was negative at those doses in the same experimental model."

Belpoggi said that, for the present, she prefers the term "enhancement" to "promotion" because, "we don't know the mechanism of action." She added that, "We are open to give our frozen material and paraffin blocks to qualified laboratories for studies of these synergistic effects."

Lifetime vs. Two-Year Exposures

We asked Belpoggi why the Ramazzini animal studies had found an EMF effect on cancer development while a similar effort that had been coordinated by NIEHS' Boorman during the 1990's had not. "A basic difference," she replied is that the Ramazzini team had used lifetime exposures while NIEHS had limited them to two years. (Note that the Boorman EMF–DMBA experiments were even shorter, lasting only 13 or 26 weeks.)

"We forgot something very simple," Belpoggi explained, and continued:

> "When we started in the 1970s, experimental carcinogenesis was the main tool to study *occupational exposures,* and exposures started in adulthood and lasted until two-thirds of the natural life, about 60 years in humans, corresponding to 104 weeks in animals. The rationale for industrial carcinogenesis in laboratory animals is very different from 'environmental carcinogenesis,' which often means low doses for the whole lifespan, starting from gestation. This is crucial and this is the reason we used long-lasting exposures."

We posed the same question to Sam Milham: He too favors extended exposure durations. "Due to the long latencies for most cancers, lifetime animal and human EMF exposure studies show most of their mortality and morbidity after midlife. This makes lifetime studies superior to short-term, follow-up studies," he said.

Back in 1998 when the first results of the Boorman–NTP EMF animal study emerged, Soffritti and his mentor, Cesar Maltoni, wrote to the NTP arguing that its experiment had ended too early and questioned whether the study had been misdesigned. "It is our belief," they said, "that the NTP bioassay was planned and conducted with a protocol that could only allow negative conclusions on 60 Hz [EMF] carcinogenesis." (See *MWN,* M/A98, p.4.)

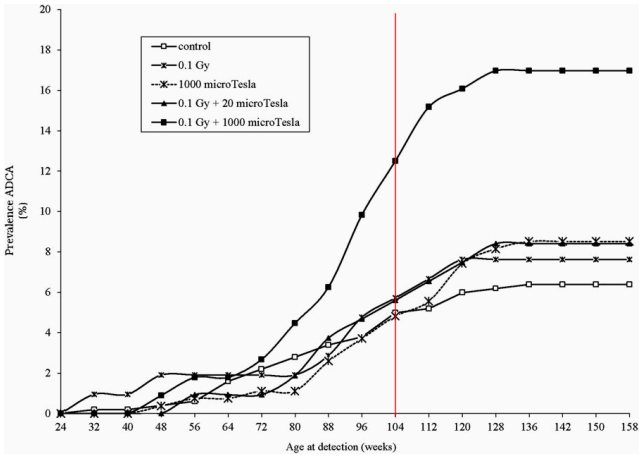
Should NTP's $25 million RF–Animal Studies Have Used Lifetime Exposures?

The Ramazzini group is running a similar project with RF radiation. Here again, these are lifetime exposure studies. Soffritti said the exposures have been completed and the experimental data are under analysis. The results should be available sometime next year. The Ramazzini studies are using far-field RF signals to mimic exposures from cell towers rather than from phones.

The National Toxicology Program (NTP) has its own ongoing, and long delayed, project on cell phone radiation —with a $25 million price tag. Here again, the NTP ended exposures after two years, even though Ron Melnick, who designed the protocol, had wanted to run lifetime exposures. He was overruled at the last minute.

We turned to Chris Portier, who made the initial decision to stop the RF exposures after two years: Do you have any regrets after reading the new Ramazzini paper, we asked. “No misgivings,” he replied. “This study actually supports that decision, it does not refute it.” (Portier noted that John Bucher, who replaced him at the helm of NTP, had made the final decision to limit the RF study to two years.)

We pointed to a graph in the Ramazzini paper showing that the prevalance of breast cancer in female rats continues to increase after two years (104 weeks, marked by our vertical red line, see below).



Cumulative incidence of breast tumors among female rats over time (in weeks); Figure 7 from the Ramazzini paper with our addition of the red line at 104 weeks

Portier countered that those later tumors would likely have been found had the study ended at two years and the animals been sacrificed and their organs examined.

History Repeats at NTP/NIEHS

There is another, disquieting parallel between the NTP’s EMF and RF animal projects. In 1995, when the NTP EMF animal studies had only just got underway and no results were yet on the horizon, Boorman gave a press interview in which he stated that it had become “obvious” to him that “there’s really nothing there,” that is, EMFs have no effects on the development of cancer (see *MWN,* J/A95, p.6).

In 2010, when the NTP RF animal studies were still in their very early stages, Bucher, the NIEHS senior manager in charge, told a local newspaper that he did not believe that cell phones can cause cancer —the very question his agency was spending $25 million to answer (see “Will NIEHS Ever ‘Get’ EMFs?”).

For more on the NTP RF study and NIEHS' peculiar modus operandi, see our recent report.

ELF EMFs, animal study, cancer promotion, Ramazzini Institute, NTP, Morando Soffritti, Fiorella Belpoggi, Elisabeth Cardis, Meike Mevissen, Christopher Portier, Gary Boorman, John Bucher, breast cancer, male breast cancer,

© Copyright Microwave News 2003-2026. All Rights Reserved.