

News of the Week

SCIENTIFIC MISCONDUCT:

Fraud Charges Cast Doubt on Claims of DNA Damage From Cell Phone Fields

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Broken connection. A university investigation found that data in two papers reporting DNA breakage in cells exposed to electromagnetic fields were fabricated.

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The only two peer-reviewed scientific papers showing that electromagnetic fields (EMFs) from cell phones can cause DNA breakage are at the center of a misconduct controversy at the Medical University of Vienna (MUV). Critics had argued that the data looked too good to be real, and in May a university investigation agreed, concluding that data in both studies had been fabricated and that the papers should be retracted.

The technician who worked on the studies has resigned, and the senior author on both papers initially agreed with the rector of the university to retract them. But since then, the case has become murkier as the senior author has changed his mind, saying that the technician denies wrongdoing. He will now agree to retract only one paper, and he also says his critics have been funded by the cell phone industry, which has an obvious interest in discrediting any evidence of harm from its products.

The contested studies, which exposed cells to EMFs equivalent to those from the most common American and European cell phones, have been widely cited by advocates of tighter regulations on cell phones. Both studies are from the lab of Hugo Rüdiger, who retired this past October after serving as director of the department of occupational medicine at MUV. Other teams have reported only cellular effects of EMFs that are more subtle than DNA breakage, such as changes in gene activation or expression. "If this work isn't solid, then one really has to give up the hypothesis that these fields cause genotoxic effects," says Anna Wobus, a developmental biologist at the Leibniz Institute of Plant Genetics and Crop Plant Research in Gatersleben, Germany, who has studied the effects of EMFs on stem cells.

The first paper, published in 2005 in *Mutation Research*, was part of a €3.2 million European Union-funded project called REFLEX, designed to investigate the cellular effects of various EMF sources. The paper soon came under strong outside criticism. Leading the way has been Alexander Lerchl, a professor of biology at Jacobs University Bremen in Germany and a member of Germany's national Radiation Protection Board. Lerchl, who has received funding from an umbrella organization that investigates EMFs,

which is funded in part by multiple cell phone operators and manufacturers, says he originally noticed something strange about the numbers in a table from the 2005 report. The variation is too low, he says: "They could not be data from biological experiments."

Last year, Lerchl conveyed his concerns to editors at *Mutation Research* and to MUV officials. In November, the editors responded saying that their experts on the technique and biostatisticians found Lerchl's calculations "suggestive" but that they "do not prove anything as serious as data falsification." Given that the experimental setup was blinded, they said, it would have been impossible to make up data that produced a desired result.

Lab chief. Hugo Rüdiger is retracting one paper because the blinding may have been compromised, but he says data in the other were not tainted.

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At MUV, a newly established ethics commission eventually decided to look into the matter in early 2008. Their full report has not been made public, but on 23 May, the university issued a press release saying that an independent review body "suggests that the suspicions were justified: The data were not measured experimentally but fabricated." In the press release, the university rector, Wolfgang Schütz, called for the 2005 paper and a 2008 paper by Rüdiger's group to be retracted.

Meanwhile, in April, unaware of the university's investigations, Christian Wolf, the interim head of Rüdiger's former department, was taking an independent look at the data after hearing they were under dispute. Wolf told *Science* that he and a colleague examined the lab notebook of technician Elisabeth Kratochvil, first author of the 2005 paper and a co-author of the 2008 study. Wolf says that they noticed a column of numbers corresponding to a code from the instrument designed to expose cell lines to EMFs. The code revealed which chamber was exposed to EMFs and which was the control. Rüdiger's team was supposed to receive the key only after sending their observational data to the device's manufacturer in Zürich, but Wolf found that the code could be observed by the turn of a knob to an "unused" channel. After being confronted with the notebook, Wolf says, Kratochvil resigned. Later, Wolf says, they found code entries in laboratory notebooks going back to the fall of 2005.

Rüdiger says he initially agreed to withdraw both papers based on the ethics committee's findings. But several days later, he discovered that the chair of the ethics committee was a lawyer who had worked for a telecom company. He also says that Kratochvil denies any wrongdoing. She quit, he told *Science*, to focus on finishing an MBA. (Kratochvil did not respond to requests from *Science* for comment.)

In June, the university established a second commission, this time with a substitute chairperson. After discussion with that body, Rüdiger says, he agreed to retract the 2008 paper, published in the *International Archives of Occupational and Environmental Health*, because he could no longer guarantee that the blinding had been airtight. In return, he says, the committee members agreed that the case would be closed. The 2005 paper is not tainted, he says. That work was done in 2003, before his lab had its own

exposure device. Kratochvil spent several weeks in a laboratory in Berlin collecting data for that study, and he says there is no evidence that she knew that device's code.

Franz Adlkofer, director of the Foundation for Behaviour and Environment in Munich and a co-author of both papers, has not agreed to the retraction, however. He says that the university declined to send him the ethics commission report, asking him instead to travel to Vienna to see it. Until he does, he says, he sees no reason to doubt Kratochvil, whom he calls an "uncommonly talented and intelligent" technician. Also not satisfied, Lerchl continues to push his case, saying he has additional evidence that data were fabricated, which he has sent to MUV. He has called on the MUV University Council, the university's highest governing body, to undertake a new investigation into all eight papers on which Kratochvil was an author. Lerchl says the chair has promised to bring up the matter when the council meets on 8 September. And an editor at *Mutation Research* told *Science* that there is an ongoing investigation into the 2005 paper.