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### Mixed Signals About Cellphones' Health Risks Hang Up Research

Debates over the best way to study phone radiation and the validity of industry-supported studies thwart firm scientific conclusions

By Paul Basken

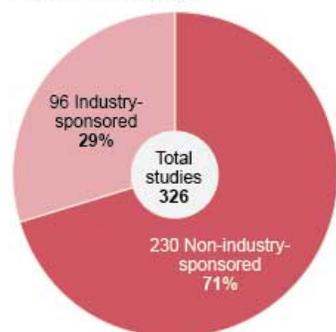
Beginning in the 1970s, researchers assessing the health risks of tobacco realized that mice trapped inside smoke-filled boxes didn't develop cancer as often as people smoking cigarettes. It wasn't that smoking was safe, or that mice were immune. The experiments had unexpected flaws.

Almost a half-century later, in a world now filled with nearly as many cellphones as people, researchers at several universities are again putting mice inside boxes. This time they're hoping to estimate the risks people may be taking by holding mobile phones against their heads and bodies. And the reliability of this research method is provoking heated debate about studies that carry health implications for almost everyone on earth.

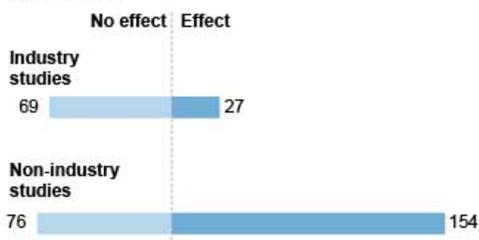
In what is emerging as the federal government's main scientific inquiry into the possible radiation risks associated with using cellphones, the National Institutes of Health is spending \$25-million on a multiyear project centered on studies of the effects of radiation on rodents.

#### Does Industry Sponsorship Hide Cellphone Dangers?

Most biological studies are not financed by industry ...



... and those studies have found greater effects from cellphone use



SOURCE: Henry C. Lai, professor of bioengineering, U. of Washington

The use of rats and mice is essential because cellphones are so new, and the development time for cancer is frequently so long, that it's impossible to make judgments from human health records.

"There really are no alternatives to animal studies," says John R.

Bucher, associate director of the National Toxicology Program at the National Institute of Environmental Health Sciences, the division in charge of the study.

Not all researchers agree. They include Henry C. Lai, a research professor of bioengineering at the University of Washington, who says he has already found clear evidence that the electromagnetic radiation emitted by cellphones damages human and animal cells on the molecular level.

Mr. Lai, who criticizes the NIH for not pursuing a more robust research agenda on a health issue of such enormous potential consequence, sees a fundamental error in trusting animals that live only a few years to predict cancers that may take decades to develop in people. "Ten years, 30 years, for brain cancer, is not unusual," he says.

#### **A Research Quandary**

Cellphones were introduced only in the 1970s and have skyrocketed in popularity in just the last 20 years, from about 12 million users worldwide in 1990 to about five billion now, according to the International Telecommunications Union.

In the absence of good data on how people fare after decades of using cellphones, researchers have tried to identify alternative methods to predict the risks.

For researchers like Mr. Lai, that generally means two approaches, neither of which is perfect: studying the effects on whole animals exposed to cellphone radiation, or studying the effects of radiation on individual cells from human beings and other animals.

Mr. Lai has emphasized the latter and says his research, carried out with federal grant money, should raise concern among cellphone users. He has reported that even small amounts of radiation from a mobile phone, over as little as two hours, can break strands of DNA in animal cells, potentially causing genetic damage and mutations that could persist for generations. Such mutations can turn a cell cancerous, he says.

The American Cancer Society is much more cautious, saying that the energy waves from cellphones "don't have enough energy to damage DNA directly" and that laboratory studies have not found evidence that phone radiation can promote tumors. The association, however, does note that the potential risks warrant more study, particularly in cases of children and heavy long-term users.

Other researchers, like Joseph L. Roti Roti, a just-retired professor

of radiation oncology at Washington University in St. Louis, go further and say that Mr. Lai is just wrong. Mr. Roti Roti, whose work has been financed by Motorola, one of the world's leading cellphone manufacturers, says he has done hundreds of tests on mice and radiation, and has never found any statistically significant evidence of harm.

A few cases have shown statistically elevated levels of health effects, but those cases are so rare, when considered against the whole study, as to be statistically insignificant themselves, Mr. Roti Roti says.

Mr. Lai, however, questions the conclusions of scientists like Mr. Roti Roti because of their research financing. Mr. Lai has compiled a summary of all known studies into the question of cellphone safety and has concluded that two-thirds of those done without industry financing report some health risk, while nearly three-quarters of those with industry financing—such as Mr. Roti Roti's—find no health effects.

But Mr. Lai has a bias of his own, counters Mr. Roti Roti, a slant that stems from his own financing source: federal science agencies. The odds of winning future government grants, Mr. Roti Roti says, are greatly enhanced by producing results that show a cause. Results that point to a potential public-health risk warrant further investigation and a favorable grant review, he says, while negative results don't inspire more largess.

#### **Cautions From the Past**

Some researchers with experience in studying another long-suspected carcinogen—cigarettes—see reason for caution in the use of animal models. Gary D. Stoner, an emeritus professor of pathology at Ohio State University, spent decades using rodents to test the effects of tobacco use. From the 1940s through the 1960s, researchers found it "very difficult to produce lung cancer in rodents with cigarette smoke," Mr. Stoner says.

Eventually they figured out why cancers in mice and rats that had been placed in smoke-filled boxes didn't reflect the danger to human smokers, some of which involved reasons unique to the rodents and some of which did not.

For instance, researchers found cancers were more likely to develop when the rodents were allowed to breathe clean air for a few months after a few months of smoke exposure, Mr. Stoner says. That appears to reflect human experience, he says, apparently a result of the fact that unrelenting smokers kill their damaged cells, while those who quit smoking may ironically give those damaged

cells a chance to turn cancerous.

But unlike people, the test mice exposed to smoke were discovered to be deliberately slowing their respiratory systems. "They would go out of their way to avoid breathing smoke," says the NIH's Mr. Bucher.

Mice placed in a box cannot avoid the radiation, but Mr. Lai warns that there could be other unforeseen variables that falsely lead researchers to declare cellphones safe. That general caution is reasonable, says John E. Moulder, a professor of radiation biology at the Medical College of Wisconsin who uses industry financing to assess the risks of cellphones.

"It's complicated," Mr. Moulder says. "One of the big difficulties in these studies has been getting the animals uniformly and reproducibly exposed."

At the same time, the problem for researchers such as Mr. Lai who want NIH support, Mr. Moulder says, is that too many studies have shown little or no effects. "Since all the types of studies that could be done have been done, it's difficult to come up with an exciting grant proposal," he says.

In the absence of proof of dangers, federal officials have joined the industry in endorsing cellphones as essentially safe to use. The federal government's main restriction involves the maximum radiation level set by the Federal Communications Commission, which bases its judgment on a measure of the thermal heating properties of each model of phone, without any apparent basis in actual health effects.

And that probably won't change anytime soon, Mr. Moulder says. "We can show that things are dangerous," he says. "We cannot prove with absolute certainty that they're safe, no matter what they are."

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