

POINT/COUNTERPOINT

Suggestions for topics suitable for these Point/Counterpoint debates should be addressed to Colin G. Orton, Professor Emeritus, Wayne State University, Detroit: ortonc@comcast.net. Persons participating in Point/Counterpoint discussions are selected for their knowledge and communicative skill. Their positions for or against a proposition may or may not reflect their personal opinions or the positions of their employers.

There is currently enough evidence and technology available to warrant taking immediate steps to reduce exposure of consumers to cell-phone-related electromagnetic radiation

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(Received 12 October 2008; accepted for publication 13 October 2008; published 6 November 2008)

[DOI: [10.1118/1.3013548](https://doi.org/10.1118/1.3013548)]

OVERVIEW

In the May 27, 2008 Larry King Live show, Dr. Vini Khurana asserted that the danger of cell phones could have far broader health ramifications than asbestos and smoking.¹ He stated that risks included brain and salivary gland tumors, behavioral abnormalities, electrohypersensitivity, and male infertility. Subsequently, in September 2008, the European Parliament voted 522 to 16 to impose tighter limits on exposure to electromagnetic fields citing as evidence a report that implicated cell phone use with brain tumors.² In sharp contrast, a National Cancer Institute study found that cell phone use posed no increased risk of brain cancers.³ Whether or not the evidence that cell phones pose a health risk is compelling enough to warrant taking steps to reduce exposure of consumers is the topic debated in this month's Point/Counterpoint.



Arguing for the Proposition is Vini G. Khurana, M.B.B.S. Ph.D. Dr. Khurana obtained his M.B.B.S. in 1995 from the University of Sydney, Australia, and his Ph.D. in Molecular Pharmacology and Experimental Therapeutics in 2001 from the Mayo Clinic, Rochester, MN. He is currently a staff specialist neurosurgeon at the Canberra Hospital and Associate Professor of Neurosurgery

at the Australian National University, Canberra, Australia. His major research interests include the risks of brain cancer from cell phone use, and diagnosis and treatment of cere-

brovascular diseases. He uses a cell phone occupationally, but never holds it to his ear.



Arguing against the Proposition is John E. Moulder, Ph.D. Dr. Moulder obtained his Ph.D. in Biology in 1972 from Yale University. Since 1978, he has served on the faculty of the Medical College of Wisconsin, where he directs the NIH-funded Center for Medical Countermeasures Against Radiological Terrorism. His major research interests include the biological basis for

carcinogenesis and cancer therapy, biological aspects of human exposure to non-ionizing radiation, and the prevention and treatment of radiation-induced normal tissue injuries. He has served on a number of national advisory groups concerned with environmental health, non-ionizing radiation, and radiological terrorism; and he currently serves as a radiation biology consultant to NASA.

FOR THE PROPOSITION: Vini G. Khurana, M.B.B.S. Ph.D.

Opening Statement

"The weight of the published scientific evidence, in addition to the opinion of global health organizations, shows that there is no link between wireless usage and adverse health effects...It's important to look at studies that are peer-

reviewed and published in leading journals and to listen to the experts.” [CTIA mantra].⁴

No link? Really? We recently examined all of the epidemiologic evidence testing an association between long-term (≥ 10 -year) cell phone use and the development of brain tumors.⁵ To be incorporated in the meta-analysis, cell phone-brain tumor epidemiology studies had to be peer-reviewed publications and include statistical reporting of participants using cell phones for ≥ 10 years. There are 11 studies that meet these criteria. Brain tumors studied were gliomas, acoustic neuromas, and meningiomas. The publications fall into two distinct data streams, namely: Hardell’s Swedish studies ($n=2$),^{6,7} which first reported an association between the use of cellular and cordless phones and brain tumors, and the multinational studies ($n=9$) of the INTERPHONE consortium (see Refs. 8–10, for examples). INTERPHONE is substantially industry-funded, although administered by the World Health Organization. Using a fixed-effects model, meta-analysis of these 11 studies with appropriate handling of pooled analyses to avoid data redundancy gives the following odds ratios [OR (95% confidence intervals; CI)] for “ipsilateral” cell phone use ≥ 10 years: glioma OR=1.9 (CI =1.4–2.4), acoustic neuroma OR=1.6 (CI 1.1–2.5), and meningioma OR=1.3 (CI 0.9–1.9).⁵ That is, there is a statistically significant elevated odds (about twofold) of developing a glioma or acoustic neuroma on the same side of the head preferred for cell phone use over a duration of exposure ≥ 10 years.

Still not convinced? Read the BioInitiative Report written by an international working group of scientists, researchers, and public health policy professionals (BioInitiative Group) concerned with electromagnetic radiation (EMR) and health.² The authors assessed more than 2000 clinical and laboratory studies and reviews and concluded that (i) the existing public safety limits for EMR exposure set by the FCC and International Commission for Non-Ionizing Radiation Protection (ICNIRP) in Europe are inadequate to protect public health, and (ii) from a public health policy standpoint, new safety limits and regulation of further deployment of risky technologies such as power lines, cellular telephones and masts, and WiFi systems are warranted based on the total weight of evidence.

Safer technology? How difficult can it be to adopt an evidence-based precautionary attitude when the technology we need to make our lives safer in this context is already available? Use a conventional landline. When you can’t, then remember that EMR-exposure respects the “inverse-square law,” so use the speakerphone mode of your cellular and cordless phones, or a hands-free car kit. If you prefer a wired earpiece, buy one that is EMR-shielded. Furthermore, support regulation of the relatively unchecked proliferation of cell phone masts (would you want one next to your child’s daycare center?) If you don’t feel like heeding any of the above, please encourage children to do so, for there are reasonable grounds to suspect a looming public health tragedy.

AGAINST THE PROPOSITION: John E. Moulder, Ph.D.

Opening Statement

In 2005, I, along with three colleagues (a biomedical engineer, an epidemiologist, and a genetic toxicologist) reviewed over 1700 publications that were relevant to the issue of whether mobile phones are a plausible cause of cancer.¹¹ We concluded that “...a weight-of-evidence evaluation shows that the current evidence for a causal association between cancer and exposure to radiofrequency (RF) energy is weak and unconvincing.”

What scientific discoveries have been made since then to justify the alarmist headlines we see about mobile phones and brain cancer? The short answer is that nothing new has been discovered that suggests a causal link, and several new studies have made the existence of a causal link even less likely.

Biophysical considerations continue to indicate that there is no theoretical basis for anticipating that RF energy would have significant biological effects at the power levels used by modern mobile phones.¹² This does not mean that such effects are impossible; it means that experimental and epidemiological studies must be very scientifically convincing to overcome this barrier.

Recently, some European studies suggested that RF energy might have genotoxic potential, but the validity of these studies is now questionable.¹³ Other *in vitro* studies continue to find no reproducible evidence that RF energy has genotoxic or epigenetic potential at the power levels used by mobile phones.^{11,12,14}

Extensive animal studies continue to find no reproducible evidence that exposure to RF energy at nonthermal intensities causes or promotes cancer.^{11,12} The only recent peer-reviewed study which did suggest that RF energy might have carcinogenic potential (a 1997 Australian study of lymphoma-prone mice) has now failed a second replication attempt.¹⁵

The epidemiologic evidence for a causal association between cancer and RF energy remains weak and limited.^{11,12,16,17} At least 17 studies have been published that report data for cancer and duration of mobile phone use. In early 2008, Kan *et al.*¹⁷ published a meta-analysis of nine such studies and found odds ratios (relative risks) for brain cancer and regular use of mobile phones that varied from 0.64 to 1.25, depending on which types of brain cancer were analyzed and on how “exposure” was defined. An even more recent meta-analysis of 17 studies was presented at the 2008 Bioelectromagnetics Society Annual Meeting;¹⁶ this study found relative risks for brain cancer and regular use of mobile phones that ranged from 0.78 to 1.07.

Some commentators have reported elevated rates of brain cancer on the side of the head where the participants recalled using their mobile phones, but in the absence of overall increases in brain cancer in regular users, recall bias¹⁸ is a stronger explanation for the ipsilateral increase than is carcinogenesis.

Weak epidemiological evidence of an association of mobile phone use with brain cancer incidence, when combined with the biophysical implausibility of a causal link and the strongly unresponsive animal studies, does not support the case that regulation of mobile phone use is urgently needed.

Rebuttal: Vini G. Khurana, M.B.B.S. Ph.D.

Respectfully, my opponent's 2005 literature review's "weight-of-evidence" conclusion is superseded by contemporary long-term (≥ 10 -year exposure) epidemiologic data. In fact, nine (82%) of the 11 long-term cell phone-brain tumor studies are not quoted in his review, understandably because these were published in the same or subsequent year(s). Even Kan's "meta-analysis" of 2008 quoted by my opponent¹⁷ is diminished by omitting all of Hardell's seminal long-term cell phone-brain tumor study data and by analyzing only one-half of the currently available long-term studies (compare this to Hardell's meta-analysis¹⁹). Despite such shortfalls, Kan still found significantly elevated odds of developing a brain tumor in the pooled long-term group. Attributing worrisome findings to "recall bias" is convenient but contested, *ergo* INTERPHONE's procrastination.⁸⁻¹⁰ My opponent asks: "What scientific discoveries have been made since then [2005] to justify the alarmist headlines...?" Here's one (for scores more read the BioInitiative Report²): In 2008, researchers at my opponent's Medical College of Wisconsin²⁰ reported that in rats chronically exposed to cell phone radiation, significant upregulation occurred of mRNA associated with proteins linked to cellular injury. They postulated that such radiation "may result in cumulative injuries that could eventually lead to clinically significant neurological damage."²⁰ Surely the unproven allegations glamorized in an article quoted by my opponent regarding one laboratory¹³ do not pertain to the many scientists who have recently reported DNA damage or modulation by cell phone radiation.²¹ "No known mechanism" does not equate to "no mechanism;" after all, the accepted tobacco-lung cancer linkage rests on epidemiology, not definitive pathophysiology.

In conclusion: (1) don't ignore emerging long-term epidemiologic data; (2) conflicting laboratory results can be due to genomic, proteomic, and experimental variations; (3) monitor future brain tumor incidence, and (4) there is technology and compelling evidence for intervention now—10 years hence may be too late.

Rebuttal: John E. Moulder, Ph.D.

To support his position that people need to be protected from mobile phone RF energy, Dr. Khurana cites two sources: his own unpublished meta-analysis and a non-peer-reviewed Internet document. The biological implausibility of the link he claims¹² and the existence of strongly unresponsive animal studies^{11,12,15,22,23} are not mentioned.

Since Dr. Khurana's meta-analysis is not published, I can say only that others who have done similar analyses have reached different conclusions.^{16,17} I note that Dr. Khurana does not address the issue of recall bias,¹⁸ that is, does his analysis show an increased overall risk of brain cancer in

heavy users of mobile phones, or is the increase he finds in ipsilateral risk counter-balanced by a decrease in contralateral risk, as has been found in other studies (e.g., Hepworth *et al.*²⁴).

The Internet summary Dr. Khurana cites² is not a source that I regard as either accurate or balanced. Among the weaknesses of that summary are its internal inconsistencies, its neglect of nonconcurring views, and the lack of a weight-of-evidence approach (e.g., it takes into account only 2 of the 35+ published animal carcinogenesis studies). The Internet report also reaches much more alarmist conclusions than those reached by established health agencies and by expert panels from across the world.

Dr. Khurana presents no peer-reviewed studies that dispute the statement that epidemiological evidence of an association of mobile phone and brain cancer is weak. He also presents nothing to dispute the statement that such a link is biophysically implausible¹² and strongly unsupported by extensive animal studies.^{11,12,15,22,23}

Calls for regulation against speculative hazards should not be issued lightly.²⁵ Such measures can have unintended consequence for safety (e.g., reducing the effectiveness of mobile phones could have serious impacts on communications in time of need). If individuals are concerned about unproven health risks from their mobile phones, by use of hands-free kits they can take inexpensive and effective measures to reduce their exposure.

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