



By Craig M. Pease

Do Cell Phones Cause Cancer?

Like one of those trick birthday candles that relight spontaneously after you blow them out, the cell phone and brain cancer wars have once again flared up, with the recent publication in *Medical Physics* of a point/counterpoint by Vini Khurana (for) and John Moulder (against).

Here there is legitimate scientific uncertainty. Believe me, there is no need for scientists to create uncertainty when none exists. We already have more of the real stuff than we need or want. With space in scientific journals at a premium, no editor would devote space to a debate unless there was substantive disagreement.

The cell phone and brain cancer story is, in part, about the fallibility of human memory. Humans forget. What is worse, we sometimes remember details consistent with our own pet theories, forgetting what is inconsistent. Lawyers use cross-examination to increase the reliability of facts drawn from human memory. Although it may seem to be an entirely trivial matter, scientists studying cell phones and brain cancer have been stymied by the mistakes people make when remembering their past use of cell phones.

One good way to solve a problem is to simply avoid it, as do Joachim Schüz and his colleagues in a key study published in the *Journal of the National Cancer Institute*. This partially industry-sponsored study enrolled some 420,095

cell phone users, comparing the incidence of brain cancer in them to that of the general Danish population. In this way, they relied on records of actual cell phone use, rather than having to reconstruct them *ex post facto*. They found almost exactly the same incidence of brain cancer in the cell phone users and the general population.

In contrast to Schüz's cohort study, case-control studies entail first searching hospital records to obtain a group of patients known to have brain cancer (cases), and then comparing them to individuals without brain cancer, who are otherwise matched as to age, gender, educational level, and other variables (controls). Each study participant reconstructs his or her own past cell phone use from memory, and the scientists ask whether cell phone use is higher in the cases than the controls.

Such case-control studies are easier and cheaper than cohort studies and there are, not surprisingly, many more of them. Peter Kan and his colleagues recently published a metaanalysis of the case-control data in the *Journal of Neurooncology*. The cell phone cancer risk, if it exists at all, is small. They find no overall increase of brain cancer among cell phone users, as compared to non-users. However, when those with more than a decade of cell phone use are considered separately, they find five cases of brain cancer among cell phone users for every four cases among non-users.

Importantly, this result rests on the assumption that the subjects reconstructed past cell phone use correctly. Work by Martine Vrijheid and her colleagues suggests that those with brain cancer may overestimate past cell phone use compared to healthy controls. Such a recall bias would likely be entirely subconscious, not reflecting any intent to deceive. Yet it could nonetheless lead to a spurious risk estimate.

But does it? In another recent review of case-control studies published in *Occupational and Environmental*

Medicine, Lennart Hardell and his colleagues ask whether brain cancers are especially common on the side of the head where the cell phone is held (ipsilateral side). Effectively, each brain cancer patient becomes their own control. Again looking at users with more than a decade of cell phone use, they find eight to ten ipsilateral brain cancer cases for every four among non-users. Brain cancer is apparently concentrated on the ipsilateral side. Alas, even this does not settle the matter.

What if those with brain cancer have an unconscious tendency to incorrectly report that they hold their cell phone on the side of their brain cancer? This is not so preposterous. Someone with brain cancer might very well spend considerable time thinking about why they got sick, searching for a rational explanation for what may simply be bad luck.

The evidence has many more twists and turns than what I can summarize here. Some case-control studies have found an elevated incidence of acoustic neuroma on the

ipsilateral side in long-term cell phone users, suggesting it may be a signature disease. Moreover, Vrijheid also shows that cases

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and controls alike make substantial errors when recalling past use, a problem that works to obscure any real risks that are present. Conversely, there is no good theory, much less any compelling data, explaining how low intensity microwave radiation might act to cause brain cancer. Scientists have, however, ruled out direct damage to DNA such as caused cancer in the survivors of Hiroshima and Nagasaki.

Fortunately, outside of the courtroom, scientists are never forced to prematurely decide a question. Here the evidence is confused. Eventually, it will be less so.

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