

Cell Phones and Cell Biology: Are We Selling Out?

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'Tis the season to, well, buy stuff. Increasingly, the stuff we buy is electronic. In fact, not only that, but increasingly the stuff we buy with is electronic, too. We are using gizmos to shop for gadgets, or possibly gadgets to shop for gizmos.

In any event, we are ever more frequently in the company of the energy fields our electronic devices, and in particular our smart phones, generate. This deserves more attention than most of us accord it.

Don't get me wrong -- I am not suggesting we return to the pre-cell phone days when we lived in dark caves. We are fully ensconced in the electronics era, and there appears to be no going back. I am as fully dependent on electronic devices as anyone, and maybe more than most, living much of my life these days online. Like so many, I am both beneficiary and victim of the attendant efficiencies. On the one hand, I can't recall how we ever got anything done in the days before instantaneous communication and push-of-a-button document transmission. On the other, I do long for the freedom of the time before an unending stream of emails became my manacles. I did sleep better in the days before bedtime meant checking one last time to see who in the world needed what, and/or finding out that someone in cyberspace [thinks I'm a moron](#). Oh, well.

Some of the risks related particularly to mobile phone use are well known. The dangers of distracted driving are common knowledge, with [cell phone use now implicated in at least 25 percent of all car crashes](#). There is some evidence that ambient levels of empathy -- our ability to understand and connect to one another's emotional state -- are declining, and possibly due to the frequency with which [technology comes between us](#). A [recent study among college students](#) finds that more frequent use of cell phones correlates with impairment of academic performance, and increased anxiety -- although the study could not prove cause and effect.

But the greatest and most insidious risk of cell phone use pertains to the electromagnetic fields of non-ionizing radiation they produce. What makes this risk insidious is our potential to dismiss it altogether, in part because it is convenient to do so, and in part because it's hard to take seriously a potential menace that is totally invisible. I suspect we are all at least somewhat prone to a "what I can't see, feel, taste, smell or hear can't hurt me" mentality.

But of course, that's clearly wrong, as we all have cause to know. Anyone who has ever had an X-ray has experienced first hand the power of an invisible force, in this case ionizing radiation, to penetrate deeply into our bodies. Anyone who has had a MRI has experienced the capacity of non-ionizing electromagnetic fields to do the same. What we can't see or feel can, in fact, reach to our innermost nooks and crannies, both to produce vivid images of our anatomy -- and exert other effects.

What exactly are those effects in the case of cell phones? The principal concern is injury to DNA in cells most proximal to the radiation source, with an attendant risk of cancer. Because cell phones are generally held to our ears, the cells in question reside principally in our brains, and the cancers of concern develop there. Other worries have been voiced, however. Carrying mobile phones in a bra [may increase the risk of breast cancer](#). A [recent animal study](#) raises concerns about the potential for behavioral disorders resulting from in utero exposure to the radiation fields that emanate from mobile phones.

None of these dangers has been established definitively, and for rather obvious reasons. Consider the study we would need, for instance, to implicate cell phone use conclusively in brain tumor development. Since brain tumors are relatively rare and take years or decades to develop, thousands of people would need to be randomized to either actual cell phone use, or placebo cell phone use, and followed for decades. Since the placebo cell phones would have to be free of electromagnetic fields, they obviously would not work. I trust you see the several challenges in getting such a trial launched.

What we are left with is decisive evidence that the radiation fields cell phones produce can and do penetrate into our bodies and brains, a variety of studies less robust than human intervention trials showing the potential for those fields to injure our cells and DNA, and observational epidemiology showing associations between cell phone use and the development of tumors.

The large technology companies that sell us our phones and service plans are the first to point out the limitations of such evidence, and to reassure us that there is no risk. But they are pretending that a relative absence of evidence is the same as clear evidence of absent risk. [That is not so](#). And they are following in the footsteps of the beverage companies that have long denied any causal connection between sugar-sweetened beverages and obesity, and they in turn of the tobacco companies that refuted links between smoking and disease, all for want of those same randomized trials.

While the collective body of evidence does not rise to the level of randomized human trials, it is persuasive in the aggregate. Besides which, something called the "precautionary principle" pertains. Basically, this public health imperative stipulates that when in doubt, we should presume there is risk, rather than presume there is none -- because that is the safer course.

I have been privileged before to share the [concerns and insights about cell phone](#) use of my expert friend and colleague, Joel Moskowitz, Ph.D., Director of UC Berkeley's Prevention Research Center. [Dr. Moskowitz' website](#) is a rich source of relevant information and sensible guidance.

I corresponded recently with Dr. Moskowitz to get an update. He noted a potential risk of increasing Bluetooth use, despite its low intensity, because research indicates that very low intensity microwave radiation can open the blood-brain barrier, an important layer of protection around our central nervous system. Additionally, Bluetooth-enabled devices that communicate with smart phones encourage us to use our smart phones all the more, and in new ways. A growing body of research suggests that the radiation from a cell phone can increase the risk of tumors not only of the brain and breast, but also the pituitary and parotid glands.

A [recent study out of Sweden](#) found a three-fold increased risk of malignant brain tumors with 25 or more years of cell phone and cordless phone use. According to Dr. Moskowitz, the only media coverage of the study was in Europe, which has generally been far more responsive to potential cell phone risk than the U.S. thus far. In a [monograph published earlier this year](#), the *World Health Organization* catalogued the electromagnetic fields of cell phones as "possibly carcinogenic to humans." Imagine the outrage if the same characterization pertained to some new chemical being imposed on us.

Dr. Moskowitz went on to point out that children are more susceptible to the effects of cell phone radiation than adults as the radiation penetrates further into their brains. A recent cohort study found a dose-response relationship between the amount of cell phone use by a child and the parent's rating of the child's ADHD symptoms on a standardized scale, although this relationship was only observed among children with slightly elevated lead levels in their blood. The results suggest that the microwave radiation exposure from the cell phone use may enable lead, which is known to contribute to ADHD, to penetrate the brain more readily.

Cellular technology is ubiquitous; that does not mean it is innocuous. History is rife with examples of things we

used routinely for a long time, from cocaine to tobacco to trans fats to mercury to radium, only to learn eventually of the perilous folly in which we were engaged. In every instance, cultural inertia and large sums of money had something to do with perpetuating what proved to be a calamitous status quo.

I have no intention of giving up my smart phone use, nor my reliance on other electronic devices -- including the one with which I am interacting as I write this. But [an array of sensible precautions](#) is readily available to us all, and I do recommend taking them seriously, and applying them.

The expression "talk is cheap" may be something of a cultural anachronism. The way we do it these days, technology-mediated talking isn't all that cheap; in fact, large sums of money change hands. But more important still are costs to our health we may be taking for granted. If we are selling out our cell biology for the sake of our cellular phones, it is a high price to pay indeed.

By all means return to your shopping for electronic devices, and forgive me for interrupting. But please apply the precautionary principle as you give and receive the gifts of modern engineering. Cellular technology matters to us all. But the cells that house our DNA matter much more. We cannot afford, for any sum of money or quantity of convenience, to sell them out.

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Dr. Katz' latest book, [DISEASE PROOF](#), is available in bookstores nationwide and at:

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