

The Highly Inconvenient Truths About Wireless Radiation—A Clarification

by Devra Lee Davis, PhD, MPH, Visiting Professor of Medicine, The Hebrew University of Jerusalem, President of Environmental Health Trust, and author of *Disconnect—the truth about mobile phone radiation*

—awarded the silver medal for courageous investigation from Nautilus Books.

“Every man is entitled to his own opinion. But every man is not entitled to his own facts.”

U.S. Senator Daniel Patrick Moynahan

The ABC *Catalyst* program *Wi-fried?* unleashed a well-orchestrated firestorm of comments alleging that the science presented was biased and inaccurate, including an invited set of highly critical commentaries in *The Conversation*. *Catalyst* journalist and producer Dr. Maryanne Demasi performed a great public service by raising important questions about a growing technology that has not been evaluated for its long-term impacts, especially on infants, toddlers and young children for whom new apps are proliferating. Dr. Demasi argued persuasively that democracy and science wither when discussion is suppressed. Informed discussion, however, must be accurate. Here I clarify key issues, and critics’ misreading of science and established facts.

Insurers do not cover health damages from mobile phones

Risk assessment grounds not only public health, it is the bread and butter of the insurance industry. Of tremendous importance for businesses is that those who require employees to use mobile phones face grave liability. For the past two decades, secondary insurers such as Lloyds of London and Swiss Re have refused to cover the telecommunications industry for health damages from mobile phones and other wireless devices, relegating them to the same category as mad-cow disease and other unpredictable but grave health risks. The solution? The global [telecom services](#) market runs about 1.7 trillion dollars—about double that of [big pharma](#). The telecom industry can afford to self-insure.

Indications that business liability can be established, and will rise, are reflected in an October, 2013 ruling from the [Italian Supreme Court](#). In confirming the award of damages to a worker who developed a tumor in the head due to long-term use of mobile phones on the job, the ruling noted the discrepancies between the low evidence of risk found by industry-funded studies and the higher evidence of risk found by independent studies. The court determined that the latter were more reliable.

In the U.S. firms are required to report their liabilities annually to the Securities and Exchange Commission. A review of those reports on behalf of all large telecom companies reveals that they take note of the fact that the resolution of lawsuits on behalf of persons with brain cancer who were heavy users of cell phones poses a significant liability.

The case for precautions on mobile phones is shared by many distinguished Australians and other experts

Prof. Dariusz Leszczynski served as a former Deputy Director of the national Finnish nuclear radiation and safety authority and now manages a highly informative blog aptly

named [Between a Rock and a Hard Place](#) that highlights evolving science and policies on wireless radiation. Not one word has been written to disagree with his comments to *Catalyst* that those who keep a phone in their pockets are exposed to levels of radiation above test results. A recent issue of the American [Consumer Reports](#) advises that phones mustn't be kept in the pocket. A website, www.showthefineprint.org provides links to manufacturers' advice about distances that mobile devices should be kept away from the body. For example, laptops are tested at 20 centimeters from a large adult male body, and are not designed to be held tightly on toddlers' laps.

A simple look at the facts shows that the program was on point in many respects. As the distinguished epidemiologist Sydney University Professor Bruce Armstrong noted, the critical question about mobile phones and health should not rest on whether or not there is yet a detectable increase in a rare type of brain cancer called glioma in the general population and certainly cannot rest on whether there is an increase in overall rates of all types of brain cancer. Rather the question should be: do we know enough now to take basic precautions to reduce exposures—especially for children?

The case for taking precautions, Prof. Armstrong added, is strong, a position also echoed by Dr. Christopher Wild, Director of the International Agency for Research on Cancer (IARC), of the World Health Organization. At a press conference announcing that the IARC had determined that mobile phone and wireless radiation should be classified as a possible human carcinogen in 2011, Dr. Wild noted, "Given the potential consequences for public health of this classification and findings, it is important that additional research be conducted into the long-term, heavy use of mobile phones. Pending the availability of such information, it is important to take pragmatic measures to reduce exposure such as hands-free devices or texting."

Further support for the need to take simple steps to reduce exposure comes from [Professor Siegal Sadetzki](#), Head of the Israeli government national Institute for Non-Ionizing Radiation Safety, who is [on record](#) as saying that, "As a specialist in public health, I say why shouldn't we take simple measures just to be on the safe side to limit exposure, especially when we are having so many children who are using them?"

Finally, more than [200 experts in the field](#) with considerable research and publication record have recently sent a petition to the UN and the WHO requesting that they act on the documented health risks of exposure to EMF/RFR.

ARPANSA provides precautionary advice for children as do other authorities

In that regard, ARPANSA Physicist Ken Karipidis and the most recent statement from that agency also clearly acknowledge the need for precautions with children, as is evident from his statement to *Catalyst*. "We do recommend that parents limit their children's mobile phone use."

Drs. Wild, Sadetzki, and I are basically issuing the same recommendations. I take strong exception to statements of psychologist Rodney Croft who contends that RF is a heavily researched agent and that there is "very strong scientific consensus that, ...that there is no substantiated evidence that the low levels of radiofrequency emissions encountered by mobile telecommunications can cause any harm."

Recently the [EMF Scientists](#), a group of more than 200 distinguished experts in the field of bioelectromagnetics sent a detailed petition to the United Nations and the World Health Organization calling for those agencies to take global action against mobile phone radiation based on growing research showing that current levels of exposure from mobile devices can cause a broad range of harmful biological impacts. Led by Columbia University Professor Emeritus Martin Blank, and Joel Moskowitz PhD, Head of the Center for Family and Community Health of the University of California, Berkeley, this statement indicated that the vast majority of biological scientists who have published research on electromagnetic fields and microwave radiation/also called radiofrequency radiation agree that there are documented health risks. Among the impacts Professor Blank recently confirmed in a letter to the Sydney Morning Herald are: “direct DNA damage (Lai and Singh), stimulation of stress proteins (Blank and Goodman), and stimulation of CaATPase (Pall). Since stress protein synthesis is also stimulated in reaction to changes in temperature, pH, toxic metals, alcohol, all potential dangers to cells, the cells are alerting us and protecting us. There can be no doubt that EMF/RFR is treated by the body as potentially harmful.”

Further, Professor Blank adds that perhaps the comments of Rodney Croft reflect the fact that as a psychologist he lacks expertise, training and familiarity with the experimental literature.

Professor Blank also noted that regarding mechanisms of action: “Drs Saunders and Swan should also be interested in the unusual properties of DNA as a fractal antenna, when considering a plausible biological mechanism. Academics have an obligation to be better informed, especially when asked to comment beyond their level of expertise.”

Permit me to add this observation: I find it especially odd that Croft asserts there are no consequences of mobile phone exposure when some of his innovative published work showed that individual responses in the brain to mobile phone were clearly and significantly affected by exposure.

- Acute mobile phone operation affects neural function in humans
[http://www.clinph-journal.com/article/S1388-2457\(02\)00215-8/abstract](http://www.clinph-journal.com/article/S1388-2457(02)00215-8/abstract)
- The effect of electromagnetic fields emitted by mobile phones on human sleep.
<http://www.ncbi.nlm.nih.gov/pubmed/26077933>

High-tech governments have implemented precautionary policies based on their review of growing scientific evidence

The statement that there is a “very strong scientific consensus...that the low levels...can not cause any harm,” ignores the IARC/WHO and many other publications showing damage to male reproductive health from low levels of radiofrequency emissions from mobile phones as well as impacts on [pregnancy](#). Croft does not include the IARC/WHO determination that mobile phones and wireless radiation constitute a possible human carcinogen made in 2011. It decidedly undermines his statements. Let’s look at what that agency concluded in their 2013 published monograph on the topic. The IARC re-affirmed its official classification that cellular radiation is a Group 2B possible human carcinogen along with lead, automobile exhaust, and other toxic substances including

DDT, heptachlor, and styrene. Their 480-page [Monograph](#) would be suitable reading for Croft and Chapman, as it provides the details of the basis of the classification, in this the most significant health report on mobile phone radiation ever published. The Monograph concludes that:

“Due to closer proximity of the phone to the brain of children compared with adults, the average exposure from use of the same mobile phone is higher by a factor of 2 in a child’s brain and higher by a factor of 10 in the bone marrow of the skull. (p. 408),

“Positive associations have been observed between exposure to radiofrequency radiation from wireless phones and glioma and acoustic neuroma. (p. 421),

“Radiofrequency electromagnetic fields are possibly carcinogenic to humans” (Group 2B)

Other examples of studies finding an increased health risk from mobile phones include:

- [A case-series report](#) by breast cancer surgeons—including Lisa Bailey MD, Past-President of the American Cancer Society of California—found a link to unusual breast tumors in young women who kept cell phones in their bras and have no genetic markers for the disease. The tumors in these young woman all were located in their breasts directly under the antennas of the phones—a fact that provoked concern from the authors.
- [A report](#) from professors at Yale University also documents serious concerns about mobile phones and can be obtained from Environmental and Human Health Inc. “Cell Phones: Technology, Exposures, Health Effects.”
- Based on these and other concerns it is of considerable relevance that on July 12, 2012 the [American Academy of Pediatrics](#) sent a letter to the Federal Communications Commission (FCC) urging the FCC to open a formal inquiry into radiation standards for cell phones and other wireless products adding, “The FCC has not assessed the standards for cell phone radiation since 1996” and that “children are... disproportionately impacted by all environmental exposures, including cell phone radiation.”
- The [UN/WHO letter](#) from Dr. Martin Bland and over 200 colleague, the EMF Scientists includes these and other instances of serious biological impacts from EMF/RF.

Croft is wrong and ignores major high-tech government efforts

In his assertion of strong scientific consensus Croft ignores the above expert opinions along with the efforts of governments of Cyprus, Israel, India, France, and Belgium. In fact, RF emissions are not heavily studied and there is no consensus of safety. The Environmental Health Trust [website](#) includes links to more than 700 key experimental studies that underlie actions of these and other governments that have all taken steps to reduce exposures especially for children.

Increased glioma risk in long-term mobile phone users in case-control studies

The Guardian report on the Catalyst program correctly notes that I have stated:

“Every single well-designed study ever conducted finds an increased risk of brain cancer with the heaviest users, and the range of the risk is between 50% to eightfold. That’s a fact.”

There is an increase in gliomas in younger persons in the U.S. and Australia, contrary to Chapman’s assertion.

"Devra Davis asserted in the program that it was too early to see any rise in brain cancer and argued that brain cancers after the Japanese A-bombs did not appear for 40 years. This is simply incorrect," says Emeritus Professor [Simon Chapman](#) in the School Public Health at the University of Sydney.

Indeed case-control studies finding increased glioma risk in heaviest users have been confirmed most recently by a large [French national study](#). Because he cannot dispute that fact, Chapman turns the discussion to the lack of an increase in the rate of brain cancer adjusted for all ages of Australians per 100,000 in the population between 1982 and today. That is misleading. Because brain cancer is a disease with a long latency, more than 80% of brain cancer occurs in persons age 60 and above; this is not the age group that has been the heaviest regular users of mobile phones in the past two decades. If one examines trends in younger persons by looking at age-specific rates of brain cancer, a distinctly different pattern can be seen. As reported by Australian neurosurgeons and American cancer experts, rates of glioma are increasing in those in their thirties and forties—the age group that has been the heaviest regular users of mobile phones.

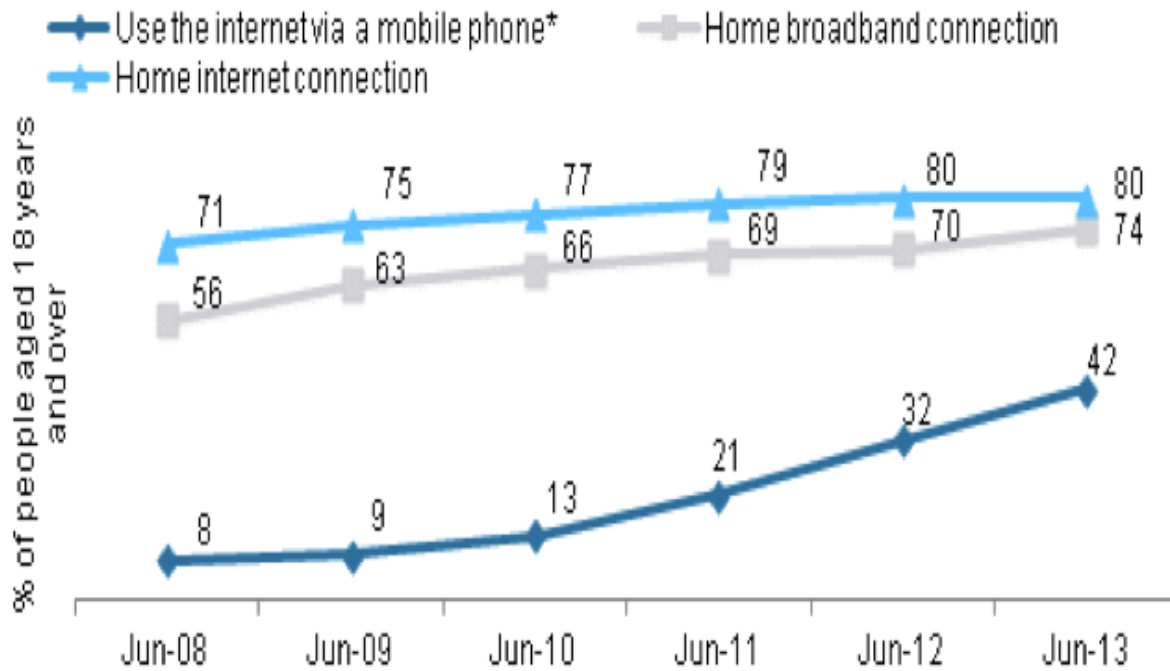
In response to my claim that the type of brain tumor related to cell phone use exhibited a latency of 40 years following the atomic bombs in Japan, Chapman highlights data on all tumors, in a 2004 publication [in the journal *Cancer*](#). **It is surprising that a distinguished researcher such as Chapman would make a fundamental mistake and focus on all central nervous system (CNS) tumours rather than specifically gliomas, the chief type of brain tumor tied with mobile phones. This study found higher rates of most CNS tumors in the first 30 years than in the following 10 years, with the notable exception of glioma. In fact, a population-wide increase in glioma did not appear until 40 years following exposure to radiation from an atomic bomb.**

"We have had mobiles in Australia since 1988—some 90 per cent of the population use them today and many of these have used them for a lot longer than 13 years, but we are seeing no rise in the incidence against the background rate," says Chapman.

In fact, while it is true that 90% of Australians use mobile phones today, the rate of use of mobile phones has been so recent and so sudden that it is not possible to expect to see an increase in glioma in the general population tied with this relatively recent increase in use.

According to industry data as shown below with the darkest blue line, the percentage of those above age 18 who used smartphones to connect to the internet has risen five-fold from 2008 to 2013; and will have increased even more in the past three years. Thus, the relative proportion of the population with heavy, regular use of mobile phones has changed much too recently to be able to detect any associated increase in glioma—a cancer known to have a latency of several decades.

The chart below shows changes in access to the internet, 2008 to 2013 (as a percentage of people aged 18 years and over).



**Relates to use of the internet via a mobile phone handset each year during the month of June.*

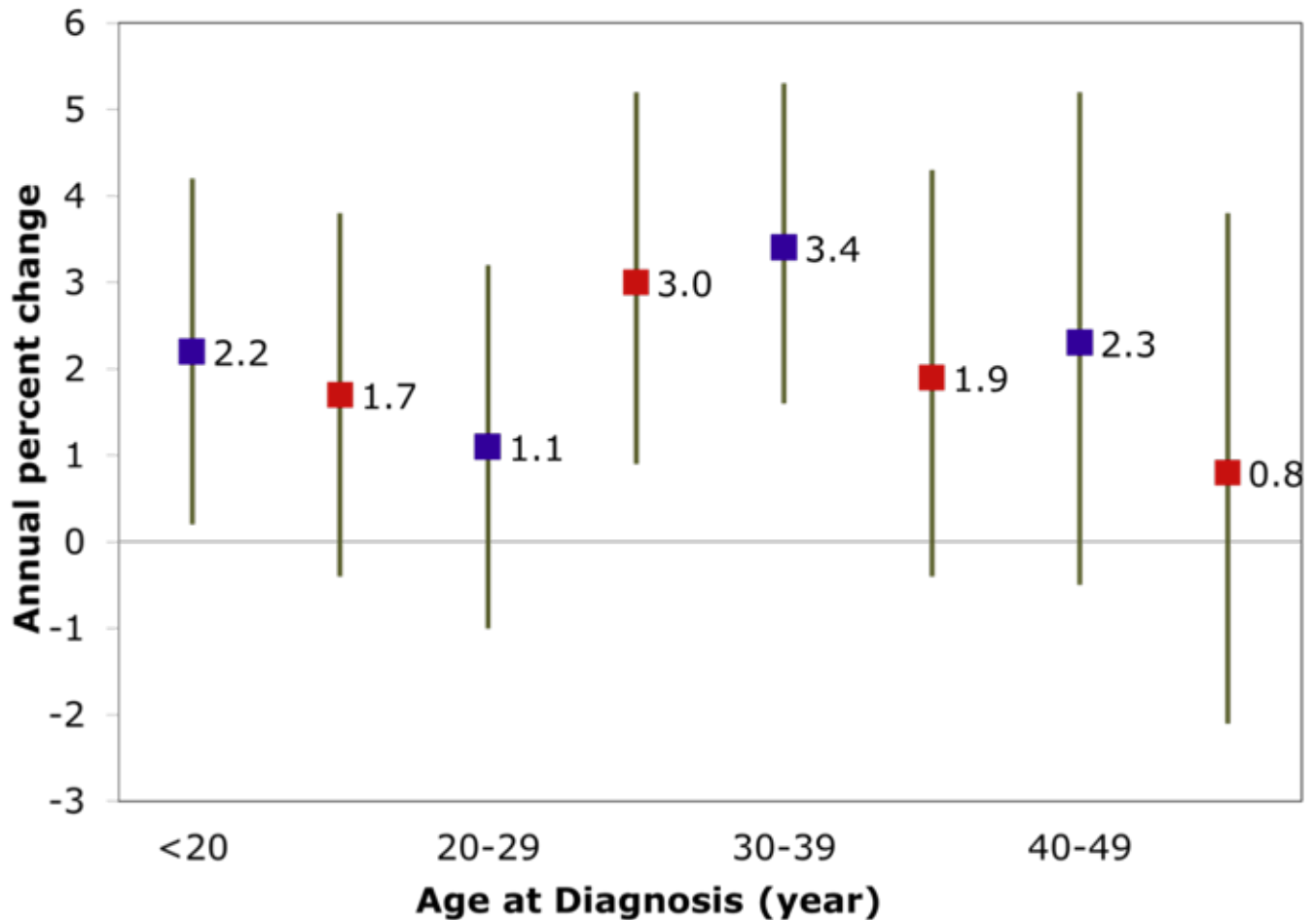
Source: ACMA Communications report 2012–13. (Fig. 5.1)

· [Figure 5.1 Changes in access to the internet \(xlsx 23 kb\)](#)

"Devra is arguing that we would see a sudden rise 40 years later. That is not what we see with cancer — we see gradual rises moving toward peak incidence, which can be as late as 30-40 years (as with lung cancer and smoking for example)."

My colleagues and I have reported an increase in gliomas in younger persons in recent years in a presentation to the American Public Health Association in 2010, and others have published an analysis that found increasing patterns of key types of brain cancer possibly tied with mobile phone radiation.

Figure 1 below from our poster shows annual percent change in glioma for persons ages 20-39 for the period 1990-2009, with total increases for the period ranging between 20-70%.



In [December, 2011](#) a study from the Keck School of Medicine, University of Southern California also noted statistically significant annual increases in frontal and temporal lobe grade IV brain cancers (glioblastoma multiforme) from 1992 to 2006. Those are the areas of the brain closest to where the cell phone is typically held that absorb the highest levels of pulsed digital signals. Increasing we understand that the pulse of the phone signal is far more important than its relatively weak average power.

In his comments in *The Conversation*, Dr. Darren Saunders also alleges that there is an "absence of a plausible biological mechanism for how this kind of radiation can cause cancer."

That is not correct and fails to take into account the exciting development of ideas underway today regarding interactions of living systems with electromagnetic radiation. The field of bioelectromagnetics is quite complex and not easily subject to sound bites of the sort provided in these comments. In fact, a revolution is taking place in medicine today in the use of low levels of RF and EMF to treat a range of diseases from cancer to inflammatory diseases. Some studies are using nanosecond long pulses to zap cancerous tumours. Saunders would do well to consult with colleagues in bioengineering. Major efforts are underway at [University of](#)

[Melbourne](#) using vagal nerve stimulation to relieve inflammatory bowel disease, supported by a large multi-year grant from the U.S. Department of Defense.

To assert that there is no plausible mechanism through which mobile phone radiation can induce cancer is to ignore the fact that a number of scientists have published peer-reviewed papers arguing that such pulsed digital but weak radiation induces inflammatory damage by interfering with calcium transport or inducing free radical formation. These are complex phenomena that are at the cutting edge of science today. In my presentations and discussions with faculty at Dartmouth College of Engineering and recently at the University of Melbourne, I have been impressed with the breadth and depth of interest in this new medical frontier.

Finally, it is well known in medicine that any agent that is biologically active in treating a disease whether aspirin or chemotherapy can also have negative effects. Thus, the fact that EMF is being used in so many [different clinical applications](#) signals that there will prove to be negative effects as well. Further references regarding basic mechanisms involved in biological responses to EMF can be found in [several papers](#) by Professor Emeritus of Washington State University, Martin Pall, where he notes that:

"Voltage-gated calcium channels (VGCCs) produce these and other EMF effects, such that the L-type or other VGCC blockers block or greatly lower diverse EMF effects. Furthermore, the voltage-gated properties of these channels may provide biophysically plausible mechanisms for EMF biological effects. Downstream responses of such EMF exposures may be mediated through Ca²⁺/calmodulin stimulation of nitric oxide synthesis. Potentially, physiological/therapeutic responses may be largely as a result of nitric oxide-cGMP-protein kinase G pathway stimulation. A well-studied example of such an apparent therapeutic response, EMF stimulation of bone growth, appears to work along this pathway"

Saunders charges that the differences between microwave oven and mobile phones were not appreciated, when he says,

"There was one point where a direct inference was made between microwave oven radiation and mobile phones," says Saunders. "Comparing a microwave to a mobile phone is like comparing a Saturn V rocket to your lawnmower."

It all depends on the nature of the comparison being made. In point of fact, a microwave oven and a phone differ in that the former uses a continuous higher powered signal, while the latter relies on a weaker pulsed signal. Both a microwave oven and a mobile phone use the same general frequency ranging between 900 MHz to 2.4 GHz. The difference is in the amount of power they require and the nature of the signal, with the oven using 1000 Watts, and the phone requiring less than 1 Watt. The repeated change in power density over time that occurs with the mobile phone may account for its biological impact, with substantial changes occurring within a single 4-second call, as is shown in [my Melbourne lecture](#).

The public is poorly served by the constrained and highly selective review of science evident in the invited comments in the February 16 issue of *The Conversation*. [Others](#) have documented that independent-appearing scientific resources regarding the telecom

industry are in fact well-disguised public relations tools for industry. Independent scientists that have charted the issue thoroughly include [Martin Blank](#), Professor Emeritus of Columbia University and George Carlo (a former industry expert). *The Conversation* would do well to tap these and other sources as it seeks to promote a full and robust exchange on one of the most pressing public health issues of our age. A democracy rests on the freely given consent of the governed to be governed. Where we are denied information on potential hazards with which we are living, democracy itself is endangered.