Written Statement of Dr. Howard Ory
Prepared in Opposition to SB 268

Introduction

I am Dr. Howard Ory. I received my MD degree from Tufts University Medical School in 1969 and joined the U.S. Centers for Disease Control (CDC) in 1971. I received a Masters Degree in Epidemiology from the Harvard University School of Public Health in 1974. I worked at the CDC as a practicing epidemiologist for twenty-three years until my retirement in 1994. While at the CDC, I held various management positions including Deputy Director for Epidemiology. Over the course of my career, I have conducted multiple large-scale epidemiologic studies involving numerous diseases including cancer. The focus of much of that research was to determine the safety of, for example, common medical practices and medications and to consider potential warnings. Over the course of my career, I have consulted on numerous public health issues for the CDC as well as other public health agencies such as the World Health Organization and the Food and Drug Administration. After retiring from the CDC, I was a Vice President for Health Care Research at Prudential Healthcare. I left there at the end of 1996, and since then I have been a private consultant in epidemiology. I have published more than 100 scientific articles in peer-reviewed publications on a wide range of subjects. My full resume is attached.

Purpose and Summary of Testimony

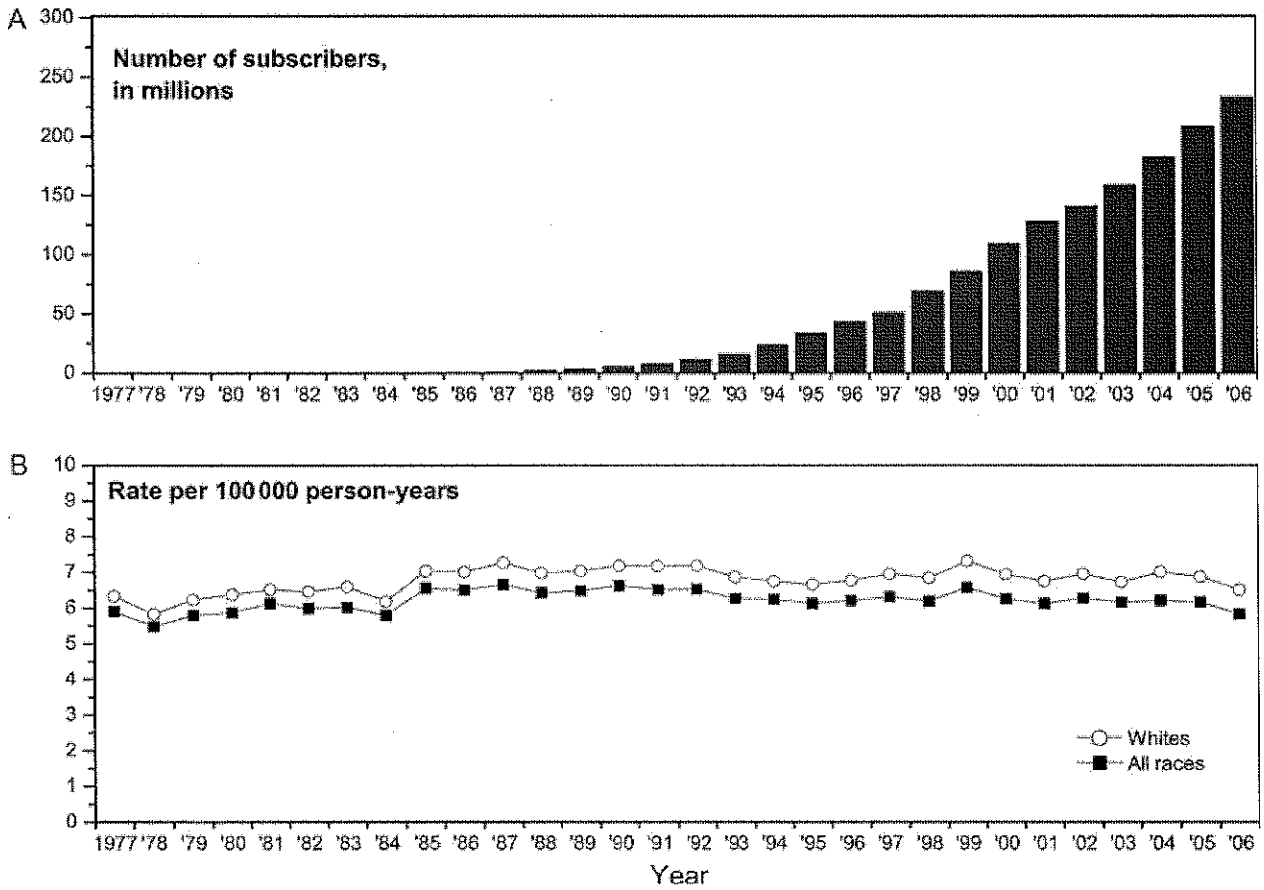
I am submitting this testimony on behalf of the wireless industry to address the proposed SB 268, which if enacted would require that all cell phone retailers and wireless service providers that operate retail stores in the State of Connecticut post display materials that include the Specific Absorption Rate (SAR) value of each phone sold and the maximum permissible SAR value set by the Federal Communications Commission (FCC). The proposed bill is identical in all material respects to the "Cell Phone Right to Know" Ordinance that the City of San Francisco enacted in July 2010 but later amended to eliminate any requirement that retailers post SAR values in their stores. As was the case with the San Francisco Ordinance, SB 268 is evidently motivated by a concern that cell phones present a threat to public health.

In my opinion, the proposed legislation is unnecessary and is not based on sound science. The weight of scientific evidence indicates no adverse health effects from wireless phone use. In addition, the proposed warning is inconsistent with the conclusions of the National Cancer Institute (NCI), Federal Communications Commission (FCC), the Food and Drug Administration (FDA) and other agencies that have reviewed the available science. A brief review of the available scientific evidence follows.

There has not been an increase in the incidence of brain cancer and other nervous system tumors following the introduction of wireless phones.

Brain cancer and other nervous system tumors (which I will refer to collectively as "brain cancer") occurred long before the introduction of wireless phones and would continue to occur even if people no longer used wireless phones. In other words, there is a natural incidence of brain cancer in the population, which includes people who use wireless phones. If, as some people speculate, wireless phone use causes brain cancer, then we would expect to see an increase in the incidence of brain cancer coincident with the use of wireless phones. We have not seen any such increase.

The U.S., like many other countries, has tracked the incidence of brain cancer for many years. These data are collected by the NCI and the CDC and are considered representative of the entire United States. In the U.S., the incidence of brain cancer has not increased since at least 1992. This is demonstrated in the charts below which are taken from a recent NCI study. This study states, "[d]uring the period of use when mobile phones was increasing sharply, the overall incidence of brain cancer changed little." The NCI report concludes, "Overall, these incidence data from the United States based on high quality cancer registries do not provide support for the view that use of cellular phones causes brain cancer."[1]



Recently in their annual report to the nation on the status of cancer, which had a special focus on brain cancer, the NCI noted that the incidence of brain cancer has fallen 0.4% per year from 1987-2007.[2]

Latency

In the U.S. alone, there were almost 40 million users of wireless phones by 1996 and there were almost 200 million in 2005. Even given the latency of brain tumors, by which I mean the time it takes to develop a tumor, the NCI notes that there has been "sufficient time" for an increased

[1] Inskip, Hoover and Devesa. Neuro Oncol. 2010 Nov;12(11):1147-51.
[2] Kohler, et al. J Natl Cancer Inst. 2011 May 4;103(9):714-36.

incidence of brain tumors caused by cell phones to begin to be detected in these surveillance data.[3] Again, however, we do not see any such increase.

Time trend data from other countries, including England, Norway, Denmark, Finland, Sweden and Switzerland, strongly reinforce the conclusion that in spite of sufficient time having elapsed, there has been no rise in brain tumor incidence. While cell phone use in those countries began earlier than in the U.S. and has risen at least as dramatically as in the U.S., brain cancer incidence rates have not changed as cell phone use has increased in the above listed countries through at least 2007 and through 2009 in Sweden where such data is available.[4]

The most recent Deltour study (2012) addresses the latency issue extensively. They note: "We detected no upward turn in the time trends of glioma incidence rates in the Nordic countries during 1979-2008, overall or in any subgroup by country, age, or sex among adults.... These analyses are based on the entire adult population of Denmark, Finland, Norway, and Sweden (17 million people) and are strengthened by the comprehensive high-quality cancer registration in these countries.... If mobile phone use causes brain tumors, the change in prevalence of use from 0 to nearly 100% over a 20-year period would eventually influence the incidence rates of these tumors. Conversely, a lack of change in the incidence time trends, at any point in time, would constitute evidence against this association.... Our data indicate that, so far, no risk associated with mobile phone use has manifested in adult glioma incidence trends...."

Time Trend Data in Children and Adolescents

While the above chart and data from other countries refer to all age groups combined, these studies have also looked specifically at children and adolescents under the age of 20 years. The results are similarly reassuring. In the US, Norway, Finland, Sweden, and England these studies report stable time trends in the incidence of brain tumors in these countries in people under 20 years of age. As the authors of the most recent time-trend study conclude about time trend data relating to those under 20 years of age: "These data are in line with our evaluation of time trends of brain tumor incidence in Sweden and altogether provide little support to the view that mobile phone use increases the risk of brain tumors."[5] In fact, there is now strong, affirmative evidence from time trend data that through 2008 in the U.S. and 2009 in Sweden cell phones have not caused an increase in brain cancer in people under 20 years of age. Given that trends in brain cancer have remained stable in young people, it is tautological that there has been no increase in brain cancer in young people that could have been caused by cell phones.

Mechanism

There is no known mechanism by which wireless phones could cause cancer.[6] Wireless phones emit a form of radiofrequency energy that is part of the electromagnetic spectrum. This energy is called non-ionizing radiation. People use many things that emit non-ionizing radiation,

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[3] Inskip, et. al., op. cit.

[4] Deltour et al. J Natl Cancer Inst. 2009; 101:1-4; Roosli et al. European Journal of Cancer Prevention 2007; 16:77-82; de Vocht et al. Bioelectromagnetics. 2011 Jul;32(5):334-9; Aydin et al. J Natl Cancer Inst. 2011; 103(16):1264-76; Schmidt et al. Pediatr Blood Cancer. 2011 Jan;56(1):65-9; Ahlbom et al. BMJ 2011; 343:d6605; Deltour et. al. Epidemiology 2012; 23: (epub Jan 12 ahead of print).

[5] Aydin et al, op. cit.

[6] Boice and Tarone. J Natl Cancer Inst. 2011 Aug 17;103(16):1211-3; Repacholi, et. al. Bioelectromagnetics. 2011 Oct 21. doi: 10.1002/bem.20716. [Epub ahead of print]

including televisions, radios, baby monitors, and cordless phones. The use of the term "radiation" in connection with the energy from wireless phones can cause confusion and fear. Non-ionizing radiation is different from what people commonly think of as "radiation." An x-ray is a good example of an exposure people think of when "radiation" is mentioned. An x-ray is one of the common forms of ionizing radiation. Non-ionizing radiation and ionizing radiation are quite different. Ionizing radiation, such as an x-ray, has the ability to damage DNA in human cells and therefore can cause cancer at high doses. By contrast, non-ionizing radiation from a wireless phone lacks the ability to damage DNA.[7] Therefore, there is no reason to believe that wireless phone use could cause cancer, and a wireless phone warning referring to electromagnetic radiation emissions and cancer would likely create further confusion and fear in consumers.

Repacholi has summarized the lack of support for any known mechanism: "In summary, the results of the *in vitro* studies are consistent with the results of the mechanistic studies, and despite extensive research that have failed to establish any relationship between exposure to RF fields and cancer. No clear pattern of evidence identifying a non-thermal mechanism that could underlie any adverse health effects of RF exposure has been identified."[8]

Despite the lack of any basis to suspect that wireless phone use could cause cancer, this issue has been studied scientifically for years. The two types of studies that provide the most information are studies in humans and studies in animals.

Epidemiology – Studies in Humans

Epidemiology is the study of causes of disease in human populations. There have been multiple epidemiologic studies of wireless phones and brain cancer. These studies have been conducted in different countries, have used varying methods and cover the time period in which wireless phones have been in use. A review of the overall results of these studies demonstrates the lack of evidence for a causal relationship between wireless phone use and brain cancer. A warning informing consumers that exposure to the electromagnetic radiation from cell phones "may cause brain cancer" is not supported by the science.

Conclusions about causation cannot be based on any one particular study; they should be based on the data as a whole. When drawing conclusions from scientific data, scientists look for consistency in the results across studies. One technique used to evaluate multiple epidemiologic studies is called meta-analysis. Meta-analysis is a statistical technique that combines data from multiple studies in order to assess any potential association between the exposure and the disease (here, between wireless phones and brain cancer). In addition, this method identifies which studies are inconsistent with the overall result from the combined data.

In September 2009, the International Committee for Non-ionizing Radiation Protection (ICNIRP) published a meta-analysis of all existing studies of wireless phone use and tumor risk.[9] ICNIRP's review included the published studies that have been conducted as part of the thirteen-country INTERPHONE study being coordinated by the World Health Organization as well as studies conducted by Dr. Hardell's group in Sweden. ICNIRP concluded that there was no

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[7] Boice, op. cit.
[8] Repacholi, et. al. Bioelectromagnetics. 2011 Oct 21. doi: 10.1002/bem.20716. [Epub ahead of print]
[9] Ahlbom et al. Epidemiology 2009;20:639-52.

overall association between wireless phone use and brain cancer, and this result was true even in people who had used a phone for more than ten years. ICNIRP identified only one outlier – the pooled analysis of the studies conducted by Dr. Hardell.

In July of 2011, after the publication of the full INTERPHONE study, ICNIRP reviewed the issue of cell phones and brain cancer again and concluded, "Although there remains some uncertainty, the trend in the accumulating evidence is increasingly against the hypothesis that mobile phone use can cause brain tumours in adults."[10] ICNIRP noted that time trend data "can give powerful evidence constraining what can reasonably be proposed as an etiological relationship." They reviewed the same time trend data that I presented above and noted these data "showed no indication of increases in brain tumour incidence in relation to the introduction and growing use of mobile phones, up to 20 years after their introduction and 10 years after their use became widespread." Finally, ICNIRP noted that the recent studies dealing with exact location of the brain tumor, "which one would expect to give the most rigorous analysis since it has greater precision without bias, does not support a causal association."

The elevated risks shown in some case-control studies are incompatible with Deltour's (2012) incidence trend findings, discussed earlier. Deltour notes that the many of the elevated risks found in some case-control studies "are implausible, implying that biases and errors in the self-reported use of mobile phone have likely distorted the findings."

At the end of last year, a prospective Danish study that included information on 3.8 million person-years of follow-up was published; this study finds no increased risk of brain tumors even after 13 years since beginning cell phone use. While the Danish cohort study, like all epidemiologic studies, has limitations, it is consistent with the time trend data, showing no association of cell phone use and brain cancer over a long time period.

Epidemiology in children and adolescents and pregnant women

There is now one published epidemiologic study of cell phone use and brain cancer among children and adolescents. It concludes, "In summary, we did not observe that regular use of a mobile phone increased the risk for brain tumors in children and adolescents."[11]

There is also one published study examining the effect on neural development of prenatal exposure to cell phone use. The study concludes, "This study gives little evidence for an adverse effect of maternal cell phone use during pregnancy on the early neurodevelopment of offspring."[12]

Animal Data

The human epidemiology provides the most information about the effect of wireless phone use on humans. However, animal studies can provide useful information because they permit controlled exposure conditions. Scientists have conducted multiple studies exposing animals to high doses of RF for the life of the animals – that is, while *in utero*, and then from birth to death. Overwhelmingly, these studies do not report an association between wireless phone exposure

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[10] Swerdlow et al. http://dx.doi.org/10.1289/ehp.1103693, published online July 1, 2011
[11] Aydin, op. cit.
[12] Vrijheid M, et.al. Epidemiology 2010; 21:259-262.

and cancer, (including tumor initiation, promotion or genotoxicity) even under these extreme exposure conditions. The results of these studies are consistent with those of the time-trend and epidemiologic studies on children and pregnant women that I discussed earlier.

The recent International Agency for Research on Cancer (IARC) classification of cell phones as showing limited evidence of carcinogenicity

Last year, the International Agency for Research on Cancer (IARC) classified RF emissions from cell phones as "possibly carcinogenic." A recent article by John Boice, a widely respected expert in this field, addressed this IARC classification.[13] After reviewing the body of research on potential health effects of cell phone RF emissions, Dr. Boice concluded:

> Amid this encouraging evidence from human observational studies, coupled with the negative findings from virtually all experimental animal and in vitro studies and the absence of any known biologic mechanism by which weak nonionizing radio waves emitted from cell phones could damage DNA and lead to cancer, it may therefore seem surprising that a monograph committee of the [IARC], an agency of the WHO, recently announced that cell phones may be "possibly carcinogenic to humans". The change from [a prior classification of] "no conclusive evidence" to "possibly carcinogenic" was not new research, and it has understandably led to widespread public as well as media concern and confusion. The footnote accompanying the [IARC] press release [announcing the classification] is often missed – that a "possibly carcinogenic to humans" (2B) classification is based on "limited evidence of carcinogenicity" and that "chance, bias, or confounding could not be ruled out with reasonable confidence" for the few positive associations reported in the literature. A published summary of the IARC working group conclusions noted that some members found the epidemiologic evidence to be inadequate to support the 2B classification. Viewed in this context, "possibly carcinogenic" is not a signal to abandon mobile phones and return the landline phones. Rather it is a signal that there is very little scientific evidence as to the carcinogenicity of cell phone use.

The above assessment is similar to the recent assessment by ICNIRP that I have reported above.

WHO, IARC's parent organization, noted in the press release accompanying IARC's classification that "[a] large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."

Following the IARC classification, the NCI reiterated its conclusion that "although there have been some concerns that radiofrequency energy from cell phones held closely to the head may affect the brain and other tissues, to date there is no evidence from studies of cells, animals, or humans that radiofrequency energy can cause cancer." The NCI added, "It is generally accepted that damage to DNA is necessary for cancer to develop. However, radiofrequency energy, unlike ionizing radiation, does not cause DNA damage in cells, and it has not been found to

[13] Boice, op.cit.

cause cancer in animals or to enhance the cancer causing effects of known chemical carcinogens in animals."

Conclusion

The scientific evidence does not support the proposed SAR display requirement. The weight of a large body of high quality scientific evidence shows no adverse health effects, such as brain cancer, from cell phone use.

The lack of association in the epidemiology and in the animal studies is consistent with the fact that brain cancer incidence, in both adults as well as children and adolescents, has not increased since wireless phone use has become common in the U.S as well as countries around the world. These data are also consistent with the fact that there is no known mechanism by which non-ionizing radiation from wireless phones could cause cancer. The FDA has stated "The scientific evidence does not show a danger to any users of cell phones from RF exposure, including children and teenagers."[14]

In addition, the available scientific evidence does not demonstrate any adverse health effects in the offspring of pregnant women. The lack of an increase in the incidence of brain cancer, the lack of any adverse effects in the totality of the animal data and the lack of a known mechanism all apply equally to pregnant women.

U.S. Government agencies that have reviewed the scientific evidence have reached the same conclusion. The federal agency with primary responsibility for regulating wireless phones, the FCC, has stated that "[t] here is no scientific evidence that proves that wireless phone usage can lead to cancer or a variety of other problems, including headaches, dizziness or memory loss."(www.fcc.gov/cgb/cellular.html#evidence). The FDA, which worked with the FCC in developing the current RF safety standard for wireless phones, has also stated "[t] he weight of scientific evidence has not linked cell phones with any health problems." (http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/CellPhones/ucm116282.htm). And the NCI states that concerns about the potential health effects of using cellular phones – "and specifically the suggestion that using a cell phone may increase a person's risk of developing brain cancer – are not supported by a growing body of research on the subject." (http://www.cancer.gov/ncicancerbulletin/NCI_Cancer_Bulletin_092308/page7)

Based on all of this evidence, it is my opinion that the proposed SAR display requirement is scientifically unfounded. As a former public health official, I firmly believe that any health-based disclosure requirements must be grounded in scientific fact. The requirement proposed here is not.

March 6, 2012

[14]See http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/CellPhones/ucm116331.htm