



Submission to Health Canada regarding Safety Code 6 Draft

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Submitted to Health Canada email: safetycode6codedesecurite6@hc-sc.gc.ca

Prevent Cancer Now is a Canadian national group with over 5000 followers, working to eliminate preventable causes of cancer.

Prevent Cancer Now sees that today's science indicates a high level of certainty that radiofrequency radiation from communication devices contributes to tumours. Sufficient evidence exists linking radiation from wireless communications devices to cancer, to justify Health Canada reducing the exposure standards under Safety Code 6, and taking steps to minimize exposures of the young and most vulnerable. Based on our analysis of missing information and shortcomings of the human epidemiology information relied upon by Health Canada, we make the following recommendations, addressing both Safety Code 6 and ancillary actions for the consideration of Health Canada:

- Scientific review to date has been neither comprehensive nor systematic. Internationally established best practices in environmental health systematic review should be applied to topics such as health outcomes and mechanisms of biological actions. Currently, bias is evident in the exclusion of recent research from the Hardell group (their work was central in the World Health Organization International Agency for Research on Cancer determination that radiofrequency radiation is a possible carcinogen), while citing the highly discredited Danish Cohort study.
- Standards under Safety Code 6 should be at least as protective as those of China, Russia and other countries where permitted levels are 100-fold lower than Canada's present standard.
- Public education and directed initiatives are needed to minimize exposure of the youngest and most vulnerable, in homes, schools, workplaces and public spaces, as well as in safest use of wireless communications devices. *Prevent Cancer Now's* information sheet is appended, to assist in this endeavour.
- Technological advances are needed and should receive urgent attention for approval, to minimize emissions. Examples include novel communication networks, and "eco" phones, baby monitors and "smart" devices that only transmit information, without constantly checking the network.
- Devices should be tested, and prominently, clearly labeled so that consumers may choose the technologies with the lowest emissions.
- Devices should be labeled clearly so that recommended distances (currently buried in fine print in the manual) will be maintained between wireless devices and the head and body, both while in use and while being carried, including in standby mode.
- Cancer data of sufficient precision and detail should be actively compiled, in parallel with data on use of wireless devices, to follow increases in related tumours. Benign growths such as acoustic neuroma should also be tracked, as they are more strongly linked in epidemiological research and they may be a better marker of effects of radiofrequency radiation on brains. Ethics of further research on phones and cancer deserve careful consideration.
- Research is needed to characterize health impacts of modulated signals as emitted by modern devices, including accounting for exposures to multiple signals from a rapidly proliferating assortment of devices and transmission infrastructure. Characteristics of alternating current supply from inverters for renewable energy systems and "smart" meters also merit research.
- Exposure to lower frequency radiation has received much less attention of late; this radiation has also been linked to cancer, while some frequencies have seen little research. Precautionary measures are merited across the electromagnetic spectrum covered by Safety Code 6.

Scientific Review

Systematic review of scientific literature was first developed for medical interventions, but is now extended to environmental health [1]. These procedures have been test-run on substances such as bisphenol-A, and are the preferred approach to Safety Code 6.

Systematic review is applied to a specific question or set of questions, with extensive professional searching of the literature, screening, data extraction and synthesis. Health Canada's evidence base is clearly incomplete. Deficiencies in the evidence base were clearly illustrated July 9th, 2014 when Canadians for Safe Technology published a collection of 139 recent scientific reports from 2009-on, that were referenced in neither the recent Canadian nor the European reviews (<http://www.c4st.org/website-pages/c4st-reviews-ignored-studies.html>). All indicate biological effects and harms of radiofrequency radiation, and most are primary research.

Only after systematic review and synthesis of the evidence is it possible to weigh it. Vague claims of using a weight of evidence approach are meaningless when the evidence base is not established, the framework for weighing is not stated, and weighing is not presented [2].

Reliance upon reviews that refer to other reviews regarding radiofrequency radiation, a prominent feature in Canada's approach to scientific assessment of health effects, is a scientific house of cards and not a reliable basis for the protection of public health.

Precaution

The Royal Society of Canada indicated that Draft Safety Code 6 was consistent with various "authoritative reviews" but left it open to Health Canada to introduce precautionary measures to further protect the most vulnerable, and to account for uncertainties in the current (unclear and incomplete) evidence base.

As discussed below, evidence linking wireless radiation to cancer is in fact stronger than depicted in Canadian documents. Health Canada should work to minimize Canadians' exposure to radiofrequency radiation, particularly among the young and most vulnerable. Advice would include, for example, to use cables and wires to the greatest extent possible, including where we live, learn, work and play, and to use devices in ways that minimize firsthand and secondhand exposures (see attachment).

Recent cancer research

Two recent research reports on cancer associated with cell phones, that were not cited in Canadian documents regarding Safety Code 6, and that supersede other reviews, indicate further good reason for concern.

Four young women with no risk factors developed multifocal invasive breast cancer, where they customarily tucked their cell phones into their bras [3]. Reports of such cancers should be actively gathered.

A May 2014 case-control study from France reported on 253 cases of glioma, 194 of meningioma and 892 matched controls. Risk of brain tumours on the side that the phone was used (ipsilateral) was double to triple for highest compared with lowest users of cell phones, measured as numbers of calls, and cumulative hours of use [4]. *Eight-fold increased risk* arose with heavy use in urban areas.

Comments on the evidence regarding carcinogenicity presented in support of draft Safety Code 6 "status quo"

Examination of cancer is quite limited in the Rationale for Safety Code 6 [5], Health Canada's scientific justification for the Code. Health Canada cites a 2010 report of the Interphone study [6], the 2011

World Health Organization International Agency for Research on Cancer (IARC) assessment of carcinogenicity that determined that radiofrequency radiation is a possible carcinogen [7], the most recent update of the Danish cohort study [8], and analyses of the incidence of brain tumours over time [9],[10],[11].

The Interphone study was a large, multi-national study of cell phone use among people diagnosed with brain tumours, compared with partially matched controls who were cancer free. One of several major weaknesses in this large study is that people who used cordless phones, that emit similar radiation, were considered to be unexposed. Methodology was not entirely consistent across all countries, such as determination of habitual side of head where the phone was held, so that increased risks were seen in some but not all substudies. This particular Interphone report, a compilation of international data, reported increased risk among those who had tumours on the same side of the head as they held their phone (ipsilateral tumours), and among the heaviest users. "Heavy use" was more than 1640 total hours (e.g. half an hour per day for 9 years) – very modest lifetime use by today's standards.

The IARC 2011 review was the most comprehensive at the time. Since its completion, several further strong studies, both new data and meta-analyses, have demonstrated highly significantly increased risks for brain tumours, particularly for those who started using phones at younger ages, and for use exceeding 10 years, spawning calls to upgrade the certainty of carcinogenicity to "human carcinogen" [12]. Another 2013 study cited by neither the Royal Society, Health Canada nor "authoritative reviews" is a pooled analysis of acoustic neuroma (a benign tumour) showing an eight-fold increase in risk with greater than 20 years since first exposure to analogue type phones, and four-fold increase when considering all wireless radiation exposure [13]. Risk increased with dose (per 100 cumulative hours) in this large study. A 2011 analysis [14] continues to be borne out, that positive studies in this area include accounting for all wireless technologies as well as the side of the head for phone use – this was highlighted by the Hardell group's report that when they analysed their data (that clearly indicates increased cancer risk) using the Interphone methodology, they found similar nondescript results [12].

The Danish Cohort study [8] is fundamentally flawed research comparing development of brain tumours in a cohort that was established in 1995. The "exposed" individuals had a private cell phone subscription while the supposedly "unexposed" individuals either had a corporate cell phone subscription (that could not be linked to an individual but was potentially associated with high use) or started using a cell phone after enrollment. There was no mechanism for assessing exposure over time, as the "unexposed" control group obtained cell phones after 1995, there was no assessment of use of cordless phones, and there was no determination of the side of head where the phone was typically held. A majority of subjects had been lost to follow-up by the final analysis. This study is among the most highly criticized papers on the *British Medical Journal* website and is not in the least bit credible, but is cited as supporting Safety Code 6.

Incidence of brain tumours reported in three studies listed as supporting Safety Code 6 include:

- time trends for glioma and meningioma in Denmark, Norway, Finland and Sweden for 1974-2003 [10]. Absolute rates increased steadily during that time but there was no discernable change in the rate of increase. This was interpreted as meaning that if cell phones cause brain tumours, the latency was greater than 5 to 10 years.
- a "consistency check" (1979-2008) by the same group concluded further that some case-control studies over-estimated risk [11]. This conclusion would hinge on two tenuous assumptions: 1. that a large fraction of current gliomas are attributable to cell phone radiation and that other contributors such as chemicals are not changing over time; and 2. that wireless radiation acts as a

promoter rather than a primary cause so that the latency would be relatively short (glioma latency may range up to 20 to 40 years). Increased risks are most commonly reported for mobile phone exposure exceeding 10 years.

- a shorter period, 1998-2007, was assessed in the United Kingdom [9]. According to national, publicly accessible data, there was increased cancer most markedly in the temporal lobe in men (1.1 to 1.5 per 100,000), a region likely to be affected by cell phone radiation. The authors concluded that there was no increase overall and precautionary measures regarding phone exposures are not warranted.

These examinations of cancer incidence trends, more than six years old and with significant limitations, are neither current nor a strong basis for setting exposure levels. If Health Canada is going to rely upon such information, please consider that in a study of 19 US states, there was a highly significant correlation between cell phone subscriptions and brain tumours [15], and in a global analysis, the only risk factor that was consistently associated with increasing incidence of cancer of the brain and nervous system was market penetration of mobile/cellular telecommunications [16].

Many factors may contribute to risks for brain tumours. This means that a large increase in cell phone related tumours would have to occur before a significant increase would be detected among tumours with other etiologies. Meanwhile, if other contributors (e.g. chemical exposures) were decreasing at the same time, which has happened in many Canadian municipalities for instance as pesticide use has been restricted, an increase from cell phones could be masked by a decrease from other causes.

The type and location of brain tumours most commonly associated with phones is quite specific, so general information on tumour incidence will be clouded with many tumours of irrelevant type and location. There is no publicly available information in Canada with the degree of detail that would be necessary to potentially discern cell phone related brain tumours.

Despite the fact that following tumour incidence is not presently a reliable basis for decision-making, with rapidly increasing use of wireless devices particularly among the young, Health Canada and the Public Health Agency of Canada should certainly be tracking brain tumours with the level of detail needed to detect increases in cell phone related malignancies. In addition, malignancies underlying storage locations (e.g. pockets and bras) and information on habitual use of cell phones for brain tumour cases should be systematically compiled.

In conclusion, there are serious concerns regarding the evidence base underpinning draft Safety Code 6. Strong links with cancer are seen in both the direct epidemiological evidence and many recent studies indicating increased genetic damage and biochemical effects (e.g. oxidative stress and effects on membranes, as detailed in the report by Canadians for Safe Technology). Even in the absence of systematic review of any of the relevant topics, it is clear that there is steadily mounting evidence of cancers and non-malignant tumours associated with radiation from modern communications devices, and a plethora of positive studies of mechanisms involved in cancer initiation and progression as well as fertility, development, and chronic conditions.

Prevent Cancer Now is concerned that inaction and merely continuing research amounts to dereliction of the duty of Health Canada, and is unethical. The present level of evidence supports reduction of permissible levels, and strong measures and public education as detailed at the beginning of this submission.

Respectfully submitted on behalf of the *Prevent Cancer Now* science group

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References

1. Rooney AA, Boyles AL, Wolfe MS, Bucher JR, Thayer KA. Systematic Review and Evidence Integration for Literature-Based Environmental Health Science Assessments. *Environ Health Perspect* [Internet]. 2014 Apr 22 [cited 2014 Apr 24]; Available from: <http://ehp.niehs.nih.gov/1307972>
2. Weed DL. Weight of evidence: a review of concept and methods. *Risk Anal Off Publ Soc Risk Anal*. 2005 Dec;25(6):1545–57.
3. West JG, Kapoor NS, Liao S-Y, Chen JW, Bailey L, Nagourney RA. Multifocal Breast Cancer in Young Women with Prolonged Contact between Their Breasts and Their Cellular Phones. *Case Rep Med*. 2013 Sep 18;2013:e354682.
4. Coureau G, Bouvier G, Lebailly P, Fabbro-Peray P, Gruber A, Leffondre K, et al. Mobile phone use and brain tumours in the CERENAT case-control study. *Occup Environ Med*. 2014 May 9;oeem-2013-101754.
5. Health Canada. Safety Code 6 (2013) –Rationale. Draft [Internet]. 2014. Available from: email to ccrpb-pcrpcc@hc-sc.gc.ca
6. The INTERPHONE Study Group. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Int J Epidemiol*. 2010 Jun 1;39(3):675–694.
7. Baan R, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, et al. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncol*. 2011 Jul;12(7):624–6.
8. Frei P, Poulsen AH, Johansen C, Olsen JH, Steding-Jessen M, Schuz J. Use of mobile phones and risk of brain tumours: update of Danish cohort study. *BMJ*. 2011 Oct 20;343(oct19 4):d6387–d6387.
9. De Vocht F, Burstyn I, Cherrie JW. Time trends (1998-2007) in brain cancer incidence rates in relation to mobile phone use in England. *Bioelectromagnetics*. 2011 Jul;32(5):334–9.
10. Deltour I, Johansen C, Auvinen A, Feychting M, Klæboe L, Schüz J. Time Trends in Brain Tumor Incidence Rates in Denmark, Finland, Norway, and Sweden, 1974–2003. *J Natl Cancer Inst*. 2009 Dec 16;101(24):1721–4.
11. Deltour I, Auvinen A, Feychting M, Johansen C, Klæboe L, Sankila R, et al. Mobile phone use and incidence of glioma in the Nordic countries 1979-2008: consistency check. *Epidemiol Camb Mass*. 2012 Mar;23(2):301–7.
12. Hardell L, Carlberg M, Hansson Mild K. Use of mobile phones and cordless phones is associated with increased risk for glioma and acoustic neuroma. *Pathophysiology*. 2013 Apr;20(2):85–110.
13. Hardell L. Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones. *Int J Oncol* [Internet]. 2013 Jul 22 [cited 2013 Aug 26]; Available from: <http://www.spandidos-publications.com/ijo/43/4/1036>
14. Levis AG, Minicuci N, Ricci P, Gennaro V, Garbisa S. Mobile phones and head tumours. The discrepancies in cause-effect relationships in the epidemiological studies - how do they arise? *Environ Health*. 2011 Jun 17;10:59.
15. Lehrer S, Green S, Stock RG. Association between number of cell phone contracts and brain tumor incidence in nineteen U.S. States. *J Neurooncol*. 2011 Feb 1;101(3):505–7.
16. Vocht F de, Hannam K, Buchan I. Environmental risk factors for cancers of the brain and nervous system: the use of ecological data to generate hypotheses. *Occup Environ Med*. 2013 May 1;70(5):349–56.

Minimize Exposure to Radiation from Wireless Communications

Radiation from wireless communication devices (WCDs) and associated transmitters was declared a possible [carcinogen](#) by the International Agency for Research on Cancer (IARC), in 2011.^{1,2} Reviews in 2013, including more recent research, justified upgrading this classification to “probable” or “known.”^{3,4} A [2014 study](#) found that over about a decade, brain cancer risks quadrupled with cell phone use for 15 hours a month, and tripled with 900 hours or more of use.⁵

WCDs include cellular and cordless phones, tablets, wifi, baby monitors, “smart” meters, wifi enabled appliances and other devices. Based on a growing base of information, it is wise to minimize exposures to the radiation in telecommunications:

- Use wires/cables/fibre at home, work and school.
- Keep your devices at a distance, and text rather than talk. Locate transmitters (e.g. “smart” meters and wifi) away from bedrooms; towers away from homes, daycares, schools and other gathering places.
- Use devices strategically - communicate when the signal is strong and turn them off whenever possible.
- Ask for and choose the safest technologies.

See the table for lots more ideas!

Background

According to the [International Telecommunications Union \(ITU\)](#), there are almost as many cellphone subscriptions as there are people in the world (96% of the population), with internet data plans also increasing (over 60% of subscriptions in North America and 75% in Europe). Transmission of all this information requires cell phone towers and other infrastructure, and the rules and roles of Canadian federal, provincial and local regulators and politicians are somewhat in flux. Individuals have less control over radiation from towers than they have over devices they own, but can and should continue to seek more protective policies. A [2014 review](#)⁶ argues for precautionary regulation of cellphone infrastructure.

Health Canada’s guideline for exposure to radiofrequency radiation was reviewed by the [Royal Society of Canada](#) in 2014.⁷ Guidelines in Canada have remained almost unchanged since 1979, while China, Russia, Italy and Switzerland have wireless radiation limits that are [100 times safer](#) than Canada’s.⁸

References

1. Baan R, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, et al. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncol.* 2011 Jul;12(7):624–6.
2. International Agency for Research on Cancer (IARC). Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields [Internet]. 2013 [cited 2013 Sep 2]. Available from: <http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>
3. Hardell L, Carlberg M, Hansson Mild K. Use of mobile phones and cordless phones is associated with increased risk for glioma and acoustic neuroma. *Pathophysiology.* 2013 Apr;20(2):85–110.
4. Davis DL, Kesari S, Soskolne CL, Miller AB, Stein Y. Swedish review strengthens grounds for concluding that radiation from cellular and cordless phones is a probable human carcinogen. *Pathophysiology.* 2013 Apr;20(2):123–9.
5. Coureau G, Bouvier G, Lebaillly P, Fabbro-Peray P, Gruber A, Leffondre K, et al. Mobile phone use and brain tumours in the CERENAT case-control study. *Occup Environ Med.* 2014 May 9;oeemed-2013-101754.
6. Roda C, Perry S. Mobile phone infrastructure regulation in Europe: Scientific challenges and human rights protection. *Environ Sci Policy.* 2014 Mar;37:204–14.
7. Kolb B, Demers P, Findlay R, Moulder J, Nicol A-M, Prato F, et al. A Review of Safety Code 6 (2013): Health Canada’s Safety Limits for Exposure to Radiofrequency Fields [Internet]. Expert Panel of the Royal Society of Canada; 2014 Spring. Available from: <http://rsc-src.ca/en/expert-panels/rsc-reports/review-safety-code-6-2013-health-canadas-safety-limits-for-exposure-to>
8. Gandhi OP, Morgan LL, de Salles AA, Han Y-Y, Herberman RB, Davis DL. Exposure Limits: The underestimation of absorbed cell phone radiation, especially in children. *Electromagn Biol Med.* 2012 Mar;31(1):34–51.

Internet resources, and groups working for safer technologies

Industry Canada SAR. www.ic.gc.ca/eic/site/ceb-bhst.nsf/eng/h_tt00084.html

Industry Canada Antenna Siting http://spectrumdirect.ic.gc.ca/pls/engdoc_anon/web_search_geographical_input

International Telecommunications Union (ITU). 2013 Facts and Figures www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

US Federal Communications Commission (FCC) Specific Absorption Rate (SAR) search www.FCC.gov/cgb/sar

US Federal Trade Commission. Cell Phone Radiation Scams. www.consumer.ftc.gov/articles/0109-cell-phone-radiation-scams

Environmental Health Trust <http://ehtrust.org>

Powerwatch <http://www.powerwatch.org.uk/>

Website of Dr. Magda Havas PhD www.magdahavas.com

Canadians for Safe Technology www.c4st.org

Citizens for Safe Technology www.citizensforsafetechnology.org

Canadian Initiative to Stop Wireless, Electric and Electromagnetic Pollution www.weepinitiative.org/

Kawartha Safe Technology Initiative www.kawarthasafetechnology.org

National Association for Children and Safe Technology <http://www.nacst.org/about.html>

Bioinitiative Report www.bioinitiative.org

Help us improve this resource! Email us at info@preventcancer.org

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Safer Use of Wireless Communications

| BE WIRED! | DISTANCE IS YOUR FRIEND | BE SAVVY | KEEP IT LOW |
|---|---|--|--|
| <p><i>Transit and receive information via wires or fibre.</i></p> | <p><i>When using a wireless device, keep your distance.</i></p> | <p><i>Use wireless devices strategically to reduce emissions and exposures.</i></p> | <p><i>Choose a low SAR, efficient device.</i></p> |
| <ul style="list-style-type: none"> Choose to use landline telephones with a cord, and wired computer networks and baby monitors. If possible, opt out of “smart” meters. Do not purchase or install wireless-enabled devices and appliances for your home. With the rare exception of some “eco” options (not yet available in Canada), cordless devices send and receive signals frequently within their networks, even when not transmitting data. Search for antennae on the Industry Canada and in the US on the Antenna Search websites. | <ul style="list-style-type: none"> At twice the distance from the source, there is a quarter of the radiation exposure. Read the manual. Manufacturers specify that for safety a device should be kept at a distance (e.g. 2.5 cm or 1 inch for a phone, 8 inches for a tablet) from the body. Carry your phone away from your body – not in a pocket or a bra, or close to the abdomen, especially if you may be pregnant. Position the keypad toward your body as more radiation comes from the back of the phone. Keep the baby monitor at a distance, not right beside the crib. Use speakerphone, or a hollow tube headset. Use a small iron bead or a knot in the wire so the headset wire will not act as an antenna. If an antenna is on or close to your building, try to sleep and spend time at a distance. Shielding (e.g. with conductive materials) can help if done properly, but may increase exposure if badly placed. Be careful with phone cases. A case that shields your body from radiation might be counterproductive, as partially blocking signals causes the phone to compensate with higher power signals. Work to ensure that towers and transmitters are located as far as possible from homes, daycares, schools, etc.; and keep wifi, “smart” meters and appliances away from bedrooms. | <ul style="list-style-type: none"> Use WCDs only when and where the signal is strong, where it can communicate using less energy. Keep your phone off or in “airplane mode,” except to check and respond to messages. Text instead of talking. Keep calls brief. Switch sides regularly so the exposure is spread out, and wait until the other person has answered to put the phone to your head. Avoid using wireless devices in vehicles or elevators, where radiation is reflected back at you by the metal structure, and transmission energy must be higher in order to compensate. Even if the vehicle is equipped with an external antenna, don’t be a distracted driver! Turn off your phone, modem and other wireless devices when sleeping. A power bar with a timer is a good idea. Just to be clear, kids, this means don’t sleep with your phone! Children should not use cellphones unless it is an emergency. Put phones and tablets on “airplane mode” if children are playing with them. Beware of free-standing “protective” crystals, etc. being promoted. They are not backed by science. Leave an operational device where reception is good, to minimize emissions. | <ul style="list-style-type: none"> The Specific Absorption Rate or SAR is a measure of the energy you might absorb when using a particular device at maximum power output. Differences in efficiencies among devices mean that the SAR does not necessarily reflect accurately day to day exposures, but it is the only information available. Some jurisdictions require retailers to display SARs. Technologies are changing rapidly, devices vary globally and SAR information may not be readily available. Try searching for your model on the Industry Canada or the US Federal Communications Commission website. Remember, no matter how low your device’s SAR may be, it still must emit radiation to in order to communicate. If the battery is discharging quickly it might mean that you are being highly exposed. Transmission accounts for most of a phone’s power consumption, so check the battery life when the device has wifi turned off and is in “airplane mode.” A low power bluetooth device transmits continuously to maintain contact with the device (e.g. phone), so is not the best choice. |