TORONTO

STAFF REPORT
ACTION REQUIRED

Prudent Avoidance Policy for Radiofrequency Emissions from Cell Towers: 2013 Update

Date:	October 21, 2013
To:	Board of Health
From:	Medical Officer of Health
Wards:	All
Reference Number:	

SUMMARY

This report responds to a motion by the Board of Health (BOH) to review the City of Toronto's Prudent Avoidance (PA) policy related to radiofrequencies (RFs) emitted from cell phone towers and to provide an update on evidence regarding public health impacts from exposure to cell tower RFs. Under the policy, adopted by City Council in 2008 as recommended by the BOH, Toronto Public Health (TPH) reviews the predicted RF values provided by companies applying to install new cell phone base stations (cell towers) in Toronto and requests that providers keep RF emission levels 100 times below Safety Code 6, Health Canada's public exposure guideline. Compliance with the PA policy is voluntary as the authority to regulate cell phone towers (including siting and the development of appropriate RF exposure levels) rests with the federal government.

Since 2008, 33 applications for towers have been assessed by TPH and compliance with the PA policy has been high. With few exceptions, RF emissions estimates typically have met the PA policy level and all have been well below Safety Code 6. The application of the policy is however restricted to a relatively small subset of cell towers in the City that are subject to municipal consultation and enforceability is constrained by a lack of municipal jurisdiction.

From its review of recent health evidence, TPH notes that the majority scientific opinion indicates that the health risk to the public from cell towers and other telecommunications sources of RFs is low.

Toronto Public Health responds regularly to resident concerns and councillor inquiries about cell phone towers and antennas. Response strategies have involved site visits, requesting information on emissions from the provider and/or Industry Canada and most recently, taking field measurements of RFs from specific antennas. The information

reviewed by TPH has indicated that the RF levels from these antenna systems have consistently been well below Safety Code 6 and have met the PA policy level.

Based on a review of evidence and TPH's experience implementing the policy, continued application of the PA policy in the form of a stricter exposure guideline is no longer necessary as it does not confer a health benefit to the residents of Toronto. The Medical Officer of Health therefore recommends that the Board support discontinuation of the PA policy. Toronto Public Health will continue to monitor the health evidence related to RFs from cell towers and will continue to respond to and address public concerns as they arise.

RECOMMENDATIONS

The Medical Officer of Health recommends that:

1. City Council discontinue the prudent avoidance policy wherein the City requests that radiofrequencies from cellular phone base stations are kept 100 times below Safety Code 6 in areas where the public normally spends time;

2. The Board of Health encourage Industry Canada to:

    a. Conduct regular monitoring for radiofrequencies arising from telecommunications structures in Toronto, and to make this information publicly available and accessible;

    b. Ensure that information regarding the locations and estimated emissions of all cellular phone antennas is publicly available and accessible;

3. The Board of Health encourage Health Canada to continue to review health evidence pertaining to human exposure to RFs and to revise Safety Code 6 whenever appropriate to protect human health;

Financial Impact

There is no financial impact arising from this report.

DECISION HISTORY

In November 1999, the Board of Health adopted a policy of prudent avoidance respecting decisions regarding the location of cell phone towers in the city. This policy recommended that consideration be given to keeping radiofrequency levels from these installations 100 times more stringent than Health Canada's guideline (referred to as

Safety Code 6) (see 1999 Summary Report and Technical Report at: http://www.toronto.ca/health/hphe/radiation/radiofrequency.htm).

In December 2007, the Board of Health reaffirmed the Prudent Avoidance policy for cell phone towers and recommended City Council incorporate it into the City's proposed Telecommunications Tower and Antenna Protocol. (Item HL10.3 at: http://www.toronto.ca/legdocs/mmis/2007/hl/agendas/2007-12-04-hl10-ai.htm; the 2007 Technical Report at: http://www.toronto.ca/health/hphe/radiation/radiofrequency.htm).

At its meeting of March 3, 4 and 5, 2008, City Council adopted the Telecommunication Tower and Antenna Protocol (http://www.toronto.ca/planning/pdf/clerks_telecom_protocol_2009.pdf). Council also adopted the Prudent Avoidance Policy and directed staff to use it to evaluate cell phone tower and antenna applications. (http://www.toronto.ca/legdocs/mmis/2008/cc/decisions/2008-03-03-cc17-dd.pdf).

At its meeting of October 17, 2011 the Board of Health requested that the Medical Officer of Health further review the Prudent Avoidance policy with respect to the siting of telecommunications towers and antennas and comment on any potential health risks and concerns arising from the increasing concentration of telecommunication towers, especially towers under 15 metres in height. (http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.HL8.7).

ISSUE BACKGROUND

The Prudent Avoidance (PA) policy for cell towers was first recommended by the Medical Officer of Health and adopted by the Board of Health in 1999 as a precautionary approach to an emerging technology whose health effects were then uncertain and generated public concern. The policy was recommended to address: uncertainties regarding the potential health effects of long-term exposure to RFs on public health and the health of vulnerable populations, particularly at the low levels emitted from cell towers; the potential for increased exposure from expansion in telecommunications infrastructure; and the steps taken in certain European and Asian countries to regulate exposure from cell towers.[1] The PA policy was intended to ensure that reasonable, low or no-cost measures would be taken to minimize exposure until more evidence became available. Under the original policy, when asked to investigate cell towers or other telecommunication installations, TPH compared proposed emissions against an exposure guideline 100 times below that required by Health Canada.

In 2008 the PA policy was formalized when it was endorsed by City Council along with the Telecommunication Tower and Antenna Protocol (the Protocol). The Protocol requests that proponents verify that emission levels from proposed cell phone towers will comply with Health Canada's Safety Code 6 and TPH staff assess the levels provided in all applications against the PA guideline. This assessment occurs for new cell towers that are subject to Industry Canada's requirements for consultation with municipalities. Since

this time, there has been a marked increase in the number of cell towers and antennas in the City of Toronto which has prompted concerns from residents.

Precautionary approaches, such as the PA policy, are intended to be reviewed and evaluated as new evidence becomes available to ensure there are no unintended consequences and to assess whether chosen measures are still needed.[2,3,4] This report reviews the most recent evidence regarding health effects of exposure to RFs, particularly at the low levels that characterize everyday exposures from cell towers. The report also reviews the implementation and impact of the PA policy in Toronto. Finally, the report evaluates the need for ongoing implementation of the PA policy in light of the health evidence and impacts of the policy.

This report was prepared in consultation with the City Planning division.

COMMENTS

The PA policy was first recommended in 1999 in response to uncertainties in the health effects evidence concerning RFs.[1] A further review in 2007 determined that these uncertainties largely remained and noted ongoing information gaps concerning low level RF exposures and cancer, impacts on sleep and non-specific symptoms and the vulnerabilities of children.[5,6] Since 2007, hundreds of individual research studies and dozens of systematic and narrative reviews of the evidence on the health effects of RF exposure have been published. The majority of these concern localized exposure to RFs from cell phones, which is many times higher than whole-body exposure from cell towers or other common sources of RFs in homes and communities.[7]

Radiofrequency Exposure and Human Health Evidence Update

Toronto Public Health reviewed the evidence related to health effects of exposure to RFs, following the Evidence-Informed Decision Making process for public health developed by the National Collaborating Centre for Methods and Tools at McMaster University.[8] The literature search of articles and reports published since the last review by TPH (2008-2013) identified over two dozen systematic and narrative reviews of the evidence which were the focus of this update. (See Appendix A for a complete list of individual resources consulted). A search of grey literature also revealed ten panel or health agency reviews from around the world (Table 1).

The TPH review found that a clear majority of high-quality studies and expert panel reviews concluded there is no clear or consistent evidence of health risks from RFs below the current exposure guidelines and particularly where it concerns exposures at the levels emitted from cell towers. A 2012 expert review of the evidence reviews and international panels drew the same conclusion.[9]

The most vocal opposing view has been put forward by scientists contributing to the BioInitiative Report.[10] This report has been evaluated by a number of health scientists and public health agencies as being characterized by biased and selective interpretation of

scientific data, leading to unscientific and alarming conclusions about a range of health conditions.[11 12 13 14]

Table 1: International health agency and panel reviews: Summary of conclusions

Review	Conclusions
International Agency for Research on Cancer (IARC) 2013[7]	Overall evaluation of RF fields as Group 2B carcinogen. The Working Group concluded: there is limited evidence in humans for the carcinogenicity of RF-EMF based on positive associations between glioma and acoustic neuroma and exposure to RF-EMF from wireless telephones. Environmental exposure to RF-EMF: no solid data.
Norwegian Institute of Public Health (NIPH) 2012[15]	The large total number of studies provides no evidence that exposure to weak RF fields (i.e., exposure within ICNIRP* reference values) causes adverse health effects. Some measurable biological/ physiological effects cannot be ruled out. There is no reason to recommend reduced exposure to RF fields to reduce general concerns about the hazardous effects of electromagnetic fields.
UK Health Protection Agency's Independent Advisory Group on Non-Ionising Radiation (AGNIR) 2012[16]	Although a substantial amount of research has been conducted in this area, there is no convincing evidence that RF field exposure below guideline levels causes health effects in adults or children.
Swedish Council for Working Life and Social Research (FAS) 2012[17]	Extensive research for more than a decade has not detected anything new regarding interaction mechanisms between RF fields and the human body and has found no evidence for health risks below current exposure guidelines. While absolute certainty can never be achieved, nothing has appeared to suggest that the long established interaction mechanism of heating would not suffice as basis for health protection.
Health Council of the Netherlands. 2011.[18]	(M)ore data are available, but not on effects in young children: studies were conducted almost exclusively in children over the age of 10 years. At this time, it can only be concluded that the still relatively limited available data do not indicate any effects on the development of the brain or on health if children are exposed to RF electromagnetic fields such as those generated by mobile telephones, mobile telecommunications antennas or Wi-Fi facilities.
Latin American Experts Committee on High Frequency Electromagnetic Fields and Human Health 2010[19]	(C)urrent science-based evidence points to there being no adverse effects in humans below thermal thresholds, no hazardous influences on the well-being and health status of users and non-users of cell phones and people living near base stations, and that no convincing evidence for adverse cognitive, behavioral and neurophysiological and other physiological effects exist.
European Commission Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) 2009[20]	Three independent lines of evidence (epidemiological, animal and in vitro studies) show that exposure to RF fields is unlikely to lead to an increase in cancer in humans. Further studies are required to identify whether considerably longer-term (well beyond ten years) human exposure to mobile phones might pose some cancer risk.
International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2009[21]	The scientific literature published since the 1998 (ICNIRP) guidelines has provided no evidence of any adverse effects below the basic restrictions and does not necessitate an immediate revision of the guidance on limiting exposure to high frequency electromagnetic fields.

Review	Conclusions
Royal Society of Canada (RSC) 2009[22]	No clear evidence of adverse health effects associated with RF fields, although continued research is recommended to address specific areas of concern, including exposure to RF fields among children using mobile phones.
Forschungszentrum Jülich GmbH Institute of Neuroscience and Medicine (INM) 2009[23]	The balance of evidence does not indicate an evaluated risk of RF EMF exposure for children's health.

Studies of Health Effects from Cell Towers

Studies focused on health effects specifically from cell towers have explored the links between cancer risk and proximity to towers or between self-reported non-specific symptoms and exposure to low level RFs in either experimental situations or in relation to an RF source in the community. Although research specific to RFs from cell towers has increased since the earlier reviews by TPH, the quality and methodological approaches of these studies remain inconsistent and highly variable. The latest research agenda on RFs published in 2010 by the World Health Organization (WHO) does not however, identify studies of health effects related to RFs from cell towers among the high priority research needs relating to population exposure to RFs.[24]

Regarding cancer risks from cell tower RFs, in 2011 the IARC identified RFs as a possible carcinogen based on limited evidence from studies of mobile phone users (see Table 1). The IARC working group's review of studies of cancer risks where exposure was from cell towers however, found this evidence to be "insufficient for any conclusion".[25] Specifically, available studies did not indicate increased risks of brain cancers from exposure to RFs from broadcast transmission or cell towers and the IARC working group was unable to make conclusions regarding leukemia and lymphoma risks from the limited studies looking at exposures to RF in the everyday environment.[7] The IARC assessment "makes no assumptions about the possible magnitude of risk"[26] – that is, the likelihood that a hazard will cause harm to public health in everyday life from any given RF source. The WHO is currently updating its risk assessment for RFs since the IARC assessment.[27]

Regarding other possible health effects, there has been considerable study of non-specific symptoms that are attributed to exposure to RF from sources such as cell towers. Non-specific symptoms are defined as "symptoms that do not indicate a specific disease process or involve an isolated body system".[28] These symptoms are broad-ranging and vary from individual to individual, including headaches, sleep disturbance, anxiety, depression and skin problems among other symptoms. One source notes several dozen different symptoms that have been reported by individuals who assess that they are sensitive to RFs and other electromagnetic fields.[28] A number of systematic reviews on this topic conclude that there is no evidence for a direct association between exposure to RFs and the frequency or severity of reported symptoms.[29,30,31]

Furthermore, these reviews conclude that based on evidence from high quality laboratory studies, people with self-declared sensitivities are not able to detect RF emissions from cell towers or other RF sources in experimental settings.[30] There is, however, growing evidence that the perception of exposure is associated with experiencing symptoms and as such, that a nocebo effect with respect to cell towers is likely contributing to individuals' reporting of such health complaints.[28,29] (This conclusion in no way diminishes the serious nature of these complaints which some individuals experience as severe and debilitating.)[16] The nocebo effect refers to the observation that people may experience adverse symptoms because of their negative expectations or concerns about cell towers. In particular, people tend to feel more at risk from environmental health hazards when they lack control over their exposure or have little perceived benefit from exposure.[32] In addition, some experts assert that precautionary measures taken by authorities do not lessen the perception of these risks, and as an unintended consequence, may worsen them.[33] The WHO has identified risk perception and public concerns about possible health effects form RFs as a priority area of research.[24] There are potential health risks related to stress arising from lack of perceived or real community control over the local environment. The sharing of information on exposure levels can build understanding and greater trust, which may increase acceptance and reduce the stress on individuals and communities.[32]

Toronto Public Health's review of health evidence clearly suggests that while some disagreement exists, the majority scientific opinion is that health effects to the public from long-term exposure to the low levels of RFs emitted from sources such as cell phone towers are unconfirmed. The risk management decisions of major international regulators in recent years suggest also there is not sufficient public health risk from cell tower RFs upon which to recommend precautionary exposure limits stricter than those established by Health Canada or other international authorities.[9]

Assessment of the Prudent Avoidance Policy

Toronto's current PA policy was adopted by the Board of Health and City Council in 2008. It applies to all applications for new cell towers that trigger Industry Canada procedures for municipal review. It is applied in conjunction with the City's Telecommunications Tower & Antenna Protocol which is administered by the Planning division. Staff from TPH's Environmental Response Team (ERT) within the Healthy Environments Directorate assess estimated RF emissions from proposed new cell towers for compliance with an exposure limit 100 times lower than the limits set out in Safety Code 6.

The PA policy's applicability is limited. Industry Canada regulations currently enable municipalities to review only certain types of applications: those for freestanding towers that are 15 metres or taller and those for rooftop cell tower installations that will increase the height of a building by more than one quarter the original building height. The PA policy does not apply in other circumstances, such as individual antennas added later to a cell tower or to towers shorter than 15 metres in height, because Industry Canada does not require cell operators to consult with municipalities for these installations. The PA policy also does not apply to other sources of ambient RFs in the community such as

broadcast transmission towers for radio and television, Wi-Fi and wireless utility meters (e.g., water and hydro). In practice however, the PA policy level has been referenced on occasion by TPH to provide perspective when asked to comment on RF levels from a range of sources.[34,35,36]

The enforceability of the PA policy is also limited. Toronto Public Health has no direct jurisdiction over the siting of cell towers; this is the responsibility of Industry Canada[37] which considers but is not obliged to act on the input from City Planning.[38] Toronto Public Health also has no direct jurisdiction over exposure limits; this is the responsibility of Health Canada.[39] Cell tower proponents report estimated emissions as a percentage of Health Canada's Safety Code 6. In the case of non-compliance with the PA policy, TPH provides a recommendation to the proponent to alter the design and/or location of the tower in order to comply with the PA policy guideline. Compliance on the part of the cell tower operators is voluntary. In the case of proposals for installations on City-owned property however, city staff negotiate to require compliance from cell operators.

Impact of the Policy

The PA policy has been applied to only a fraction of the new cell towers and antennas in the City of Toronto. Between 2008-2013, TPH reviewed 33 applications for new cell towers covered under the Protocol. However, according to Industry Canada data compiled in 2012 for TPH by a third party firm,[40] since February 2010 alone, 456 new towers and 9,329 new antennas had been installed across the city. Towers under 15 metres also increased but at a much more modest rate. Fewer than 10% of new towers and less than 1% of new RF-emitting antennas meet Industry Canada criteria that trigger the application of the Protocol and the PA policy. The majority of these new towers appear to be rooftop installations that are taller than 15 metres but do not increase the height of the host building by more than one quarter the original building height. The majority of new antennas were co-located on existing towers, a practice encouraged under the Protocol in order to reduce the number of new towers in Toronto.

According to Industry Canada, RF levels have stayed relatively stable in the City of Toronto. Industry Canada's most recent measurement of RF levels in Toronto in 2008-2009 reportedly showed no substantial changes in RF levels from their previous review in 2001-2002.[41,42] In addition, measurements at both time points indicated broadcast antennas (including, primarily, the CN Tower), and not cell towers, were the major contributors to RF levels in Toronto. A review by the British Columbia Centre for Disease Control and National Collaborating Centre for Environmental Health provides a helpful explanation for why RF levels would not increase over time: "Although intuitively, one may assume that an increase in base stations means higher ambient exposure, mobile phones do not need to use as much power (due to adaptive control) to communicate with the base stations due to shorter distances. As a good connection translates into lower output power levels, urban centres with higher base station densities often experience lower RF than rural centres."[28]

Between 2008 and 2012, most new tower applications reviewed by TPH reported estimated radiofrequency emissions well below Safety Code 6 and meeting the PA levels.

Industry response to non-compliance with the PA policy has been mixed. Of the four initially non-compliant tower applications, two voluntarily took measures to meet the PA policy levels and two proceeded without making changes to their original plans. Community opposition to a new tower appears to be as effective as TPH comment in altering plans for proposed cell towers. [43] For example, one proponent withdrew their application altogether and two changed the tower locations after community members voiced their objections.

Other Jurisdictions

While some European countries and China maintain precautionary exposure limits, other major Canadian (for example, Vancouver[44]) and North American jurisdictions do not consider RF emissions from cell towers to constitute a public health risk and therefore do not endorse exposure limits lower than Health Canada's Safety Code 6 or the equivalent international exposure guidelines.[28]

Toronto Public Health Investigations

In 2012 alone TPH received and responded to about 45 public requests for service (such as inquiries, complaints, requests for investigation or information) related to RFs. Many of these related specifically to cell phone towers and antennas. Toronto Public Health continues to monitor scientific evidence so as to provide the most current public health advice to decision makers and the public regarding the health effects of RF exposure.

Recently, TPH teamed up with experts from Public Health Ontario (PHO) to measure ambient RFs in the vicinity of new rooftop antenna systems in response to resident concerns. One field study for an antenna system installed on a low rise apartment building in a residential area near High Park indicated that even maximum RF levels measured from the antenna in question were well below Safety Code 6 and below the PA level including at sensitive sites such as a local park with a children's playground and a nearby church. Findings were shared with interested community members through the local councillor. Toronto Public Health staff also presented the findings and responded to questions at a community meeting. While residents remained concerned with the lack of transparency in the antenna siting, they understood the jurisdiction issues and were satisfied with TPH's response.

Since the initial investigation near High Park, TPH has worked with PHO for three additional investigations including two standalone cell towers and another rooftop installation. To date, all field measurements illustrate that the ambient RF in the vicinity of the antennae are well below Safety Code 6 and meet PA levels. In all cases the impact of TPH involvement and responsiveness to concerns presented by community members has been positive. Toronto Public Health has been able to mitigate health impacts related to the nocebo effect (noted earlier) through education and effective risk communication.

Recommended Path Forward

Regardless of views on the adequacy of exposure guidelines, greater information, public engagement and consultation on cell tower siting is an important component of addressing resident concerns related to exposure to RFs.[44] Toronto Public Health can play

a role in ensuring that the public's interests are considered in relation to cell tower siting and responding to public concerns even in the absence of a PA policy. Toronto Public Health has the authority to investigate potential health hazards. Under Ontario's Health Promotion and Protection Act (HPPA), TPH must investigate any health hazard "that has or is likely to have an adverse effect on the health of any person" and must stay informed on matters of occupational and environmental health.[45] Concerns that RF exposure may exceed Health Canada's Safety Code 6 are therefore subject to investigation by TPH. Residents concerned about the sources, levels and public health impacts of RF fields can call 311 to be directed to TPH. Residents concerned about individual sensitivities to environmental exposures may be directed to primary health care providers.

Toronto Public Health finds also that because of jurisdiction issues, federal government departments have a large role to play in addressing public concerns. As such, TPH encourages Industry Canada to: conduct regular monitoring for RFs arising from telecommunications structures in Toronto, and to make that information publicly available and accessible; to ensure that information regarding the locations and estimated emissions of all cellular phone antennas is publicly available and accessible; and to consult with the public and the City of Toronto regarding all new standalone and rooftop cell towers erected within the City. Further, TPH encourages Health Canada to continue to regularly review health evidence pertaining to human exposure to and effects from RFs and to revise Safety Code 6 whenever appropriate. Health Canada completed its most recent review of Safety Code 6 in 2012 which updates the last review from 2009. At the request of Health Canada, the Safety Code 6 review document is under peer review by a panel of experts chosen by the Royal Society of Canada (RSC) to ensure Health Canada's proposed revisions are sound.[46] The RSC panel is expected to consult with the public this fall and release its peer review some time in 2014. Toronto Public Health will follow this process and review the findings from Health Canada and the RSC panel.

Conclusion

The Prudent Avoidance policy is no longer required in the City of Toronto. Industry Canada notes that ambient RF levels have not substantially increased in Toronto despite visible increases in the number and density of RF-emitting telecommunication sources. Toronto Public Health's ad hoc RF measurement studies in response to resident concerns confirm that RF levels from local antennas are well below Safety Code 6. This may in part be due to the lower RF emissions of newer telecommunications technologies. There is increased certainty and scientific consensus that human health is adequately protected from low level exposure to RFs in the community, such as from cell towers, by Safety Code 6 (or comparable international guidelines). Toronto Public Health will nonetheless continue to monitor the science and Health Canada's updates to Safety Code 6, along with responding to resident concerns and providing information where possible to help allay these concerns.

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SIGNATURE

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ATTACHMENTS

Appendix A: Resources Consulted in the Health Evidence and Risk Assessment Review

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