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RADIOFREQUENCY ELECTROMAGNETIC RADIATION AND THE HEALTH OF CANADIANS

Report of the Standing Committee on Health

**Ben Lobb
Chair**

JUNE 2015

41st PARLIAMENT, SECOND SESSION

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has the honour to present its

THIRTEEN REPORT

Pursuant to its mandate under Standing Order 108(2), the Committee has studied Health Canada Safety Code 6 and has agreed to report the following:

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RADIOFREQUENCY ELECTROMAGNETIC RADIATION AND THE HEALTH OF CANADIANS

INTRODUCTION

On 24 February 2015, the House of Commons Standing Committee on Health (the Committee) adopted the following motion:

That the Committee undertake a comprehensive study of no fewer than two meetings, plus one to consider a draft report, to study the Health Canada Safety Code 6 on human exposure to electromagnetic energy, that it invite relevant witnesses to appear, and that the committee reports its findings to the House.

At the time that the motion was adopted, the 2009 version of *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz* (Safety Code 6) was under review by Health Canada. The revised version of Safety Code 6¹ was published on 13 March, which was prior to the Committee's first meeting on the issue.²

Andrew Adams, Director General of the Environmental and Radiation Health Sciences Directorate at Health Canada, stated to the Committee that “[w]ith the recent update, Canadians should be confident that the radiofrequency exposure limits in Safety Code 6 are now among the most stringent science-based limits in the world.”³

Numerous concerns relating to radiofrequency (RF) exposure were raised by witnesses during Committee meetings on Safety Code 6 as well as in the briefs that were submitted. Many witnesses suggested that there were problems relating to the Expert Panel of the Royal Society of Canada (Expert Panel) that had been asked by Health Canada to review its proposed revision, and a number of witnesses raised issues relating to how Health Canada determined what scientific evidence to consider when it established the RF exposure limits contained in Safety Code 6. Witnesses also spoke to possible links between RF exposure and cancer, reproductive issues and autism. These concerns tied in to other testimony that expressed unease about RF exposure in schools as a result of the use of Wi-Fi; the need for RF exposure limits and guidelines to protect vulnerable populations such as pregnant women, infants and children, and others who may be more susceptible to the effects of RF exposure; and electromagnetic hypersensitivity (EHS).

1 http://www.hc-sc.gc.ca/ewh-semt/consult/2014/safety_code_6-code_securite_6/final_finale-eng.php.

2 The Committee hearings on Health Canada's Safety Code 6 took place on 24 March 2015, 23 April 2015 and 28 April 2015.

3 House of Commons Standing Committee on Health, 2nd Session, 41st Parliament, Evidence, 24 March 2015, 1535 (Andrew Adams, Director General, Environmental and Radiation Health Sciences Directorate, Health Canada).

While witness testimony and briefs often emphasized the need for Health Canada to take a precautionary approach to RF exposure by reducing the limits established by Safety Code 6 (and sometimes provided examples of limits and other measures taken to protect populations from RF exposure in other jurisdictions), they also referred to steps that individuals can take to reduce their own RF exposure. Finally, some witnesses stated that industry should play a role in reducing RF exposure.

A. Electromagnetic radiation

Wireless devices such as cell and cordless phones, baby monitors and smart meters transmit and receive signals from fixed base stations: cell towers in the case of cell phones and a base component in the case of cordless phones. The signal used for this communication is RF electromagnetic radiation (EMR). The electromagnetic spectrum spans from high energy X-rays and gamma rays at one end to lower energy radiowaves and microwaves at the other, with visible light in between. Higher energy radiation is referred to as ionizing, while lower energy radiation is referred to as non-ionizing. Ionizing radiation has sufficient energy to break molecular bonds and to remove electrons from atoms or molecules, resulting in the formation of a charged atom, called an ion. The damaging effects of ionizing radiation result from this ability to change the composition of matter. Non-ionizing radiation, which is the type emitted by cell and cordless phones, emits only sufficient energy to vibrate atoms (heating), but not enough to remove electrons. The area occupied by the EMR is referred to as the electromagnetic field (EMF), and the farther away from the source of the EMR, the weaker the EMF becomes.

B. Safety Code 6

According to Health Canada, the purpose of Safety Code 6

... is to establish safety limits for human exposure to radiofrequency (RF) fields in the frequency range from 3 kHz to 300 GHz. The safety limits in this code apply to all individuals working at, or visiting, federally regulated sites. These guidelines may also be adopted by the provinces, industry or other interested parties.

...

This code has been adopted as the scientific basis for equipment certification and RF field exposure compliance specifications outlined in Industry Canada's regulatory documents (1-3), that govern the use of wireless devices in Canada, such as cell phones, cell towers (base stations) and broadcast antennas. Safety Code 6 does not apply to the deliberate exposure for treatment of patients by, or under the direction of, medical practitioners. Safety Code 6 is not intended for use as a product performance specification document, as the limits in this safety code are for controlling human exposure and are independent of the source of RF energy.

In a field where technology is advancing rapidly and where unexpected and unique exposure scenarios may occur, this code cannot cover all possible situations. Consequently, the specifications in this code may require interpretation under special circumstances. This interpretation should be done in consultation with scientific staff at the Consumer and Clinical Radiation Protection Bureau, Health Canada.

The safety limits in this code are based on an ongoing review of published scientific studies on the health impacts of RF energy and how it interacts with the human body. This code is periodically revised to reflect new knowledge in the scientific literature and the exposure limits may be modified, if deemed necessary.⁴

As Andrew Adams explained to the Committee, “[w]hile Safety Code 6 recommends limits for safe human exposure, Health Canada does not regulate the general public's exposure to electromagnetic RF energy.”⁵

C. The House of Commons Standing Committee on Health’s report, *An Examination of the Potential Health Impacts of Radiofrequency Electromagnetic Radiation*, December 2010

In December 2010, the Committee released a report titled [*An Examination of the Potential Health Impacts of Radiofrequency Electromagnetic Radiation*](#). The Committee held three meetings and heard from a variety of witnesses, including government officials, stakeholders and scientists with expertise in the field. At that time, the Committee heard testimony relating to the development and implementation of Safety Code 6 as well as concerns relating to Safety Code 6.

The Committee made the following recommendations:

- 1) That the Government of Canada consider providing funding to the Canadian Institutes of Health Research in support of long-term studies examining the potential health impacts of exposure to radiofrequency electromagnetic radiation.**
- 2) That Health Canada request that the Council of Canadian Academies or another appropriate independent institution conduct an assessment of the Canadian and international scientific literature regarding the potential health impacts of short and long-term exposure to radiofrequency electromagnetic radiation, which would include an examination of electromagnetic sensitivity and a comparison of public policies in other countries governing exposure to radiofrequency electromagnetic radiation; and report on its findings.**
- 3) That Health Canada and Industry Canada develop a comprehensive risk awareness program for exposure to radiofrequency electromagnetic radiation, which would include Health Canada making public in an accessible and transparent way all the studies and analyses undertaken by the Department**

4 Health Canada, [*Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz*](#), 13 March 2015.

5 House of Commons Standing Committee on Health, 2nd Session, 41st Parliament, *Evidence*, 24 March 2015, 1530 (A. Adams, Health Canada).

on the impact of radiofrequency electromagnetic radiation on human health, as well as the provision of information promoting the safe use of wireless technologies.

- 4) That Health Canada and Industry Canada offer to provide information, including awareness sessions on exposure to radiofrequency electromagnetic radiation.
- 5) That Health Canada ensure that it has a process in place to receive and respond to reports of adverse reactions to electromagnetic radiation emitting devices.

There was no government response to this report prior to the dissolution of Parliament when the 2011 federal election was called.

THE EXPERT PANEL OF THE ROYAL SOCIETY OF CANADA ON SAFETY CODE 6

A. Role of the Expert Panel

In 2013, Health Canada drafted revisions to Safety Code 6 and asked the Royal Society of Canada to establish an expert panel to review the proposed Code. An expert panel of the Royal Society of Canada had also been asked to review the first version of Safety Code 6 (SC6) in 1998.

In its spring 2014 report, [*A Review of Safety Code 6 \(2013\): Health Canada's Safety Limits for Exposure to Radiofrequency Fields*](#), the Royal Society of Canada stated that it "was asked to address five key questions."⁶ These questions were:

1. Do the basic restrictions specified in SC6 (2013) provide adequate protection for both workers and the general population from established adverse health effects from RF fields?
2. Are there any other established adverse health effects occurring at exposure levels below the basic restrictions in SC6 (2013) that should be considered for revising the basic restrictions and reference levels in SC6 (2013)?
3. Is there sufficient evidence upon which to establish separate basic restrictions or recommendations for the eye?
4. Do the reference levels established in SC6 (2013) provide adequate protection against exceeding the basic restrictions in SC6 (2013)?

6 Royal Society of Canada, [*A Review of Safety Code 6 \(2013\): Health Canada's Safety Limits for Exposure to Radiofrequency Fields*](#), Spring 2014, p. 17.

5. Should additional precautionary measures be introduced into the human exposure limits in SC6 (2013)? If so, what is recommended and why?

B. The Expert Panel's conclusions

With respect to the five questions that the Expert Panel had been asked to examine, its chair, Dr. Paul Demers, explained to the Committee that the panel concluded that the basic restrictions in Safety Code 6 provided adequate protection from established adverse health effects, that there were no other established adverse health effects occurring at exposure levels below the basic restrictions in Safety Code 6, that there was insufficient evidence to warrant establishing separate basic restrictions or recommendations for the eye, and that Health Canada should review the proposed reference levels “to make them somewhat more restrictive in some frequency ranges to ensure a larger safety margin for Canadians, including newborn infants and children.”⁷ Finally, with respect to whether additional precautionary measures should be introduced into Safety Code 6's RF exposure limits, Dr. Demers stated that

although there was a range of opinions on the panel regarding precautionary efforts, overall the panel believed that Safety Code 6 was well-designed to avoid established health effects; we did not have any science-based recommendations for precautionary measures to lower the limits....⁸

He also explained that the panel had made a number of other recommendations to Health Canada, including that Health Canada should:⁹

- investigate EHS;
- develop a public, suspected disease cluster reporting system along with a protocol to investigate clusters;
- expand its risk communication strategy and provide consumers with more information about RF radiation; and
- identify additional practical measures that individuals can take to reduce their RF exposure.

Dr. Frank Prato, Imaging Program Leader and Assistant Scientific Director, Lawson Health Research Institute, noted that in section 10.2 of the panel's report the panel

7 HESA, *Evidence*, 24 March 2015, 1555 (Dr. Paul Demers, Director, Occupational Cancer Research Centre, Cancer Care Ontario, As an Individual). With respect to the eye, Dr. Demers noted that “Recent studies do not show adverse health effects in susceptible regions of the eye at exposure levels below those proposed by Safety Code 6 for the head, neck, and trunk.”

8 Ibid.

9 Ibid., 1600.

recommended that Health Canada pursue research relating to the possible effects of exposure to RF energy at levels below the limits in Safety Code 6.¹⁰

C. Concerns with the Expert Panel’s review

A number of witnesses expressed concerns with respect to the Expert Panel’s review of Safety Code 6. For example, Prof. Martin Blank stated that there should have been a biologist on the panel,¹¹ and Dr. Anthony Miller, who was a peer reviewer for the draft Expert Panel report, noted that “the panel had insufficient expertise in epidemiology.”¹² Dr. Miller also stated that “the panel was conflicted”¹³ and that the panel report “says that the panel did not have adequate time to do a full review of the data, they therefore relied on reviews of other people and they did not do a detailed evaluation of the studies,”¹⁴ a situation which, according to Dr. Miller, led them to false conclusions. Prof. Dariusz Leszczynski stated that “some of the experts [on the panel] are known to advise the telecom industry. This is a serious potential conflict of interest.”¹⁵

“WEIGHT OF EVIDENCE” VERSUS “STRENGTH OF EVIDENCE” CONSIDERATION OF SCIENTIFIC STUDIES

Much of the testimony during the Committee’s hearings focussed on which studies Health Canada had considered as part of its review of Safety Code 6. A number of witnesses referenced 140 studies that had been submitted by Canadians for Safe Technology (C4ST) to Health Canada but that Health Canada had not included in its consideration of the revision of the Code.

When he appeared before the Committee, Andrew Adams from Health Canada explained that

[w]hen developing the exposure limits in the revised Safety Code 6, departmental scientists considered all peer-reviewed scientific studies, including those pertaining to both thermal and non-thermal [effects], and employed a weight-of-evidence approach when evaluating possible health risks from exposure to RF energy.

10 HESA, *Evidence*, 24 March 2015, 1545 (Dr. Frank Prato, Imaging Program Leader and Assistant Scientific Director, Lawson Health Research Institute).

11 HESA, *Evidence*, 24 March 2015, 1710 (Prof. Martin Blank, Special Lecturer, Department of Physiology and Cellular Biophysics, Columbia University, As an Individual).

12 HESA, *Evidence*, 23 April 2015, 1535 (Anthony Miller, Professor Emeritus, Dalla Lana School of Public Health, University of Toronto, As an Individual).

13 Ibid.

14 Ibid.

15 HESA, *Evidence*, 23 April 2015, 1640 (Dariusz Leszczynski, Adjunct Professor, Department of Biosciences, University of Helsinki, As an Individual).

The weight-of-evidence approach takes into account both the quantity of studies on a particular end point and the quality of those studies. Poorly conducted studies receive relatively little weight, while properly conducted studies receive more weight.¹⁶

...

In updating Safety Code 6, Health Canada made use of existing internationally recognized reviews of the literature along with its own expert review of the relevant scientific literature. Numerous reviews on this issue have been written in recent years by international organizations such as the World Health Organization, the European Commission's Scientific Committee on Emerging Newly identified Health Risks, and ICNIRP....

While Safety Code 6 references these international reviews, the code is an exposure guideline, not a scientific review article. Accordingly, most individual scientific studies are not referenced in the code. However, this does not mean that Health Canada did not consider all relevant scientific information when deriving the science-based exposure limits in the code....

It should be noted that studies with inappropriate study design or methodology can lead to erroneous results that are scientifically meaningless.

Studies were considered not to be of sufficient quality to inform the recent update if it was not possible to determine the dosage studied, if the study lacked an appropriate control, if experiments within the study were not repeated a sufficient number of times, if no statistical analysis of the results was conducted, or if other improper scientific techniques were used. Of the 140 studies that have been cited, a large number fall into this category.

Other studies were not considered to be within scope. For example, some of these studies looked at exposures to a frequency range outside of the frequency range covered by Safety Code 6 and were therefore not considered relevant.

However, Health Canada did consider all studies that were considered to be both in scope and of sufficient quality for inclusion in our risk assessment. While it is true that some of these studies report biological or adverse health effects of RF fields at levels below the limits in Safety Code 6, I want to emphasize that these studies are in the minority and they do not represent the prevailing line of scientific evidence in this area.¹⁷

Health Canada submitted a summary table of the 140 studies that had been presented by C4ST. That document noted that 36 of the studies “were considered to be in scope and of sufficient quality for risk assessment.”¹⁸ Frank Clegg, Chief Executive Officer of C4ST, stated that “all of these studies show impacts with radiation below Safety Code 6 limits.” Furthermore, he stated that “[i]t is unclear how many studies you need to outweigh 36 studies that show harm, especially to children.... Despite requests to publish the weight-of-evidence criteria, as per international standards, Health Canada refuses to

16 HESA, *Evidence*, 24 March 2015, 1530 (A. Adams, Health Canada).

17 *Ibid.*, 1540.

18 Health Canada, “Analysis of 140 Studies Submitted by Canadians for Safe Technology (C4ST) During the Public Comment Period on Safety Code 6,” distributed 24 April 2015.

do so.”¹⁹ Prof. Blank referenced the studies presented by C4ST, noting that “they were omitted through an evaluation by non-biologists.”²⁰ Dr. Meg Sears, Adjunct Investigator at the Children’s Hospital of Eastern Ontario Research Institute, stated that “[a] lot of the recent research demonstrating potential harm was omitted from reports that supported Safety Code 6.”²¹

POSSIBLE HEALTH EFFECTS OF EXPOSURE TO RADIOFREQUENCIES

A. Cancer

The Committee heard that the World Health Organization’s (WHO) International Agency for Research on Cancer (IARC) has classified RF exposure as a possible human carcinogen. Andrew Adams stated that “Health Canada certainly is monitoring the scientific literature when it comes to what is going on with cancer and RF fields and will continue to do so.”²² James McNamee, Chief, Health Effects and Assessments Division, Healthy Environments and Consumer Safety Branch, Health Canada, who was a member of the IARC panel, stated that

you can never prove that something is safe or that something will never happen. We're subject to the evidence base we have at this time. The IARC committee looked at that evidence. Basically, there were studies that found effects and studies that didn't find effects. Many animal and in vitro studies were looked at. Based on this examination, they made a recommendation that it be classified 2B, as possibly carcinogenic to humans. That recommendation acknowledged that there was some credible evidence suggesting that there might be a risk in the long term, but that it was impossible to make a causal association at this time.²³

Prof. Rob Tarzwell, Clinical Assistant Professor, Faculty of Medicine at the University of British Columbia, supported IARC’s conclusion that there was limited evidence of a causal link between carcinogenicity and RF exposure, “meaning the quality of the evidence is limited.”²⁴

In contrast, Anthony Miller stated that there have been a number of studies since the IARC review and that, in his view, those studies “reinforce the evidence that radio frequency fields are not just a possible human carcinogen, but a probable human carcinogen, putting it in the category 2A.” Dr. Demers indicated that the Expert Panel had

19 HESA, *Evidence*, 23 April 2015, 1545 (Frank Clegg, Chief Executive Officer of Canadians for Safe Technology).

20 HESA, *Evidence*, 24 March 2015, 1655 (M. Blank, As an Individual).

21 HESA, *Evidence*, 24 March 2015, 1645 (Dr. Meg Sears, Adjunct Investigator, Children’s Hospital of Eastern Ontario Research Institute, As an Individual).

22 HESA, *Evidence*, 24 March 2015, 1625 (A. Adams, Health Canada).

23 HESA, *Evidence*, 24 March 2015, 1635 (James McNamee, Chief, Health Effects and Assessments Division, Healthy Environments and Consumer Safety Branch, Department of Health).

24 HESA, *Evidence*, 23 April 2015, 1455 (Rob Tarzwell, as an Individual).

“tried to identify papers that were published since [the IARC review], and then looked at the entire body of research that was done.”²⁵

A number of witnesses put forward evidence that they had compiled to support the link between RF exposure and cancer. Studies and other evidence cited by witnesses that demonstrate links between RF exposure and cancer include:

- “up to fourfold increases ... were seen in Sweden with use of wireless phones, both cellphones and cordless phones;”²⁶
- research by Alexander Lerchl that showed that “electromagnetic fields obviously enhance the growth of tumours”;²⁷
- “a large case controlled study [in France], which found a doubling of risk of glioma, the most malignant form of brain tumour, after two years of exposure to cellphones. After five years it was five times the risk”;²⁸
- “seven case reports of women who developed unusual breast cancers in the exact position where they kept cellphones in their bras”;²⁹
- “evidence of testicular cancer among police officers that had radar guns and were using radar to detect speeding. They very seldom turned the guns off and just kept them on their laps”;³⁰ and
- “Increased risk of brain cancer in long-term, avid users ... shown by three replicated epidemiological studies: European INTERPHONE, Swedish Hardell group, and French CERENAT studies”.³¹

Prof. Tarzwell noted the possibility that the INTERPHONE and Swedish studies may have been affected by recall bias.³²

25 HESA, *Evidence*, 24 March 2015, 1620 (P. Demers, as an Individual).

26 HESA, *Evidence*, 24 March 2015, 1645 (M. Sears, As an Individual).

27 HESA, *Evidence*, 24 March 2015, 1705 (M. Blank, As an Individual).

28 HESA, *Evidence*, 23 April 2015, 1535 (A. Miller, As an Individual).

29 Ibid.

30 HESA, *Evidence*, 23 April 2015, 1610 (Professor Magda Havas, Environmental and Resource Studies, Trent University, As an Individual).

31 HESA, *Evidence*, 23 April 2015, 1645 (D. Leszczynski, As an Individual).

32 Prof. Tarzwell explained recall bias in this context as follows: “In other words, if you have a catastrophic health outcome, you will naturally search for causal evidence for that outcome. If a well-funded scientific committee wants to talk to you, then the implicit suggestion may be that it thinks there might be a link there. As a result, anxiety rises, and it’s not very difficult to imagine how individuals with a glioma might report, “Why, yes, I believe I did have higher exposure to radio frequencies.”” (23 April 2015, 1655).

Some witnesses emphasized the need for cancer data collection.³³ As Dr. Sears explained,

The data collection for cancers is usually done by the Canadian Cancer Society and StatsCan, but it's very, very crude data that they're bringing together. For instance, you can find data since 1992 on brain tumours and [the] central nervous system, but you can't find glioma or something like that. Hardell could do his studies because in Sweden they were collecting very specific data, and they've been collecting it for ages.

Andrew Adams from Health Canada indicated that he was “not aware of databases that Health Canada has established to look at cancers and perhaps clusters, but I think there is a question of jurisdiction here that would have to be considered as well.”

Considering the evidence it heard with respect to the potential carcinogenicity of RF exposure from wireless devices such as cell phones, as well as the need for better data collection relating to cancer incidence and cell phone use, the Committee therefore recommends

Recommendation 1

That the Government of Canada, in collaboration with the health departments of the provinces and territories, examine existing cancer data collection methods to improve the collection of information relating to wireless device use and cancer.

B. Fertility

Dr. Devra Davis, President and Founder of Environmental Health Trust, discussed studies relating to the effects of RF exposure on sperm. Effects of cell phone radiation on sperm included decreasing the number of live sperm and damaging sperm's motility.³⁴ Sperm exposed to a laptop were also damaged.³⁵ Dr. Davis also referenced a study that found that middle-aged male rats that were exposed to a computer-generated mobile phone signal for two hours per day for 45 days had lower testosterone levels and decreased fertility.³⁶ Dr. Meg Sears also referenced a study that demonstrated that sperm exposed to cell phone radiation stop swimming, have damaged DNA and die.³⁷

33 See, for example, 24 March 2015, 1725 (M. Sears, As an Individual); 23 April 2015, 1630 (A. Miller, As an Individual).

34 Slide presentation to HESA, “The Impact of EMR on Male and Female Reproduction and the Need for the Precautionary Principle Input to the Standing Committee on Health House of Commons of Canada”, 28 April 2015 (Dr. Devra Davis, President and Founder, Environmental Health Trust).

35 HESA, Evidence, 28 April 2015, 1640 (D. Davis).

36 Ibid., 1645.

37 HESA, Evidence, 24 March 2015, 1645 (M. Sears, As an Individual).

C. Autism

Martha Herbert, Assistant Professor of Neurology at Harvard Medical School, Massachusetts General Hospital, explained to the Committee that

the alterations in cell chemistry and physiology that have been identified in autism have virtually all been documented as affective electromagnetic frequencies including radio frequency radiation. Other environmental exposures and genetic vulnerabilities may also contribute to this impairment of cell function, but the cumulative effect, the total load of these environmental stressors, is likely to be what causes autism and triggers or exacerbates its challenging behaviours, and we can do something about the contribution of electromagnetic fields.³⁸

OTHER CONCERNS RELATING TO EXPOSURE TO RADIOFREQUENCIES

A. Electromagnetic hypersensitivity

One of the recommendations made by the Expert Panel was that Health Canada “investigate the problems of individuals with what’s called electromagnetic hypersensitivity ... with the aim of understanding their health conditions and finding ways to provide effective treatment.”³⁹ As Dr. Magda Havas explained to the Committee:

Symptoms of electrohypersensitivity include headaches, chronic pain, chronic fatigue, sleeping problems, difficulty concentrating, poor short-term memory, mood disorders including depression and anxiety, dizziness, nausea, and tinnitus. As many as 3% of the population, one million Canadians, have EHS symptoms that are so severe they are unable to function in our modern world.⁴⁰

Dr. Riina Bray, Medical Director of the Environmental Health Clinic at the Women’s College Hospital, noted that the number of diagnosed cases of EHS has increased dramatically in the last 10 years and that many individuals who are sensitive to EMF “find everyday life and work difficult and uncomfortable.”⁴¹ Symptoms can come on quickly and can require as long as a day to recover from, depending on the individual.⁴²

She also stated that there was a need for better collection of data and better education for physicians relating to the effects of EMF and the condition of EHS,⁴³ pointing to the Austrian Medical Society (which published a report on diagnosis and treatment of

38 HESA, *Evidence*, 28 April 2015, 1630 (Martha Herbert, Assistant Professor of Neurology, Harvard Medical School, Massachusetts General Hospital, As an Individual). Prof. Herbert co-authored “Autism and EMF? Plausibility of a pathophysiological link”, which was published in a peer-reviewed journal in June 2013.

39 HESA, *Evidence*, 24 March 2015, 1600 (P. Demers, As an Individual).

40 HESA, *Evidence*, 23 April 2015, 1555 (Dr. Magda Havas, Professor, Environmental and Resource Studies, Trent University, As an Individual).

41 HESA, *Evidence*, 28 April 2015, 1530 (Dr. R. Bray, Medical Director, Environmental Health Clinic, Women’s College Hospital, As an Individual).

42 *Ibid.*

43 *Ibid.*, 1535.

EHS patients) as an example of a physician initiative.⁴⁴ C4ST also highlighted the need to collect better information and better educate physicians.⁴⁵ Andrew Adams stated that consumers who have complaints relating to RF fields created by cell phones can use the Canadian consumer product safety system.⁴⁶

A number of briefs outlined individual struggles with EHS.⁴⁷ One individual who wrote to the Committee anonymously indicated that he had been diagnosed as having EHS at the Environmental Health Clinic in 2014:

Despite the fact that the school board has three letters of diagnosis and answers to difficult questions it posed about my functional disability, the school board nor the union have made any accommodations for me in the work place. This is because our board cites Safety Code 6 as being protective enough, and relies on it, despite my physical ailments due to ongoing exposure.

...

I have been suffering the ill health effects from low level microwave radiation for over 4 years now since the school board had 18 to 19 WiFi routers installed in every school, and my symptoms have increased in severity and frequency.⁴⁸

Tammy Beck also shared her EHS experience in a letter to the Committee:

My symptoms include incredible headaches that leave me feeling buzzed and unclear for hours after exposure. I have difficulty concentrating, memory impairment and difficulty sleeping. I feel fatigued and sometimes dizzy from close or prolonged exposure. EHS is a cumulative illness and my symptoms are worsening at an alarming rate.

...

Wi fi and cell phones are everywhere. I cannot go to the coffee shop with friends or even the grocery store (which now has 17 routers). I cannot step into my children's schools without instantly feeling ill, so I am no longer actively involved in school activities and trips, which greatly disappoints my children.

...

44 Ibid.

45 "Re: Recommendations concerning disease and health conditions surveillance," letter to the Committee dated 14 April 2015 (Deborah McCutcheon, Medical Liaison Director, Canadians for Safe Technology).

46 HESA, *Evidence*, 24 March 2015, 1610 (A. Adams, Health Canada).

47 See letters submitted to the Committee dated 16 April 2015 (anonymous); 20 April 2015 (Janis Hoffman) 20 April 2015 (Tammy Beck); no date (Charlotte McCallum); no date (Francine Lajoie, Smart Meters and French Representation, C4ST).

48 Letter submitted to the Committee dated 16 April 2015 (anonymous).

I have been moody and irritable with my family because I feel awful a lot of the time and my children and husband do not deserve this. They are suffering too and it breaks my heart[.]⁴⁹

Prof. Anne-Marie Nicol, who helped with the Expert Panel's public consultation, stated that

we need a place for people to go and discuss their symptoms or the constellations of symptoms. Here in B.C. we have what are called complex chronic disease clinics. I know in Ontario we have environmental health clinics. I think these are very important places for people to be treated and to start to collect data for surveillance.⁵⁰

...

As an epidemiologist I believe it's important that we understand what people are exposed to, or their symptoms, so that we can at least come up with an overall sense of what's going on in this country. Currently that data is not being collected. In fact, we allow these people to be shunted from one specialist to another where they get increasingly frustrated and become incredibly vulnerable to non-medical interventions. I think, as a society, we need to be doing a better job of addressing these people who appear to be very seriously affected by this.

A number of recommendations were proposed by witnesses and submitted in briefs to address EHS-related issues, including:

- having Parliament recognize the physical symptoms of EHS;⁵¹
- developing a method to track people suffering from EHS;⁵²
- recognizing EHS as a functional disability;⁵³
- establishing a Canada-wide program to train health care professionals to recognize, diagnose and treat patients with EHS effectively;⁵⁴
- accommodating EHS sufferers in the workplace;⁵⁵

49 Letter submitted to the Committee dated 20 April 2015 (T. Beck).

50 HESA, *Evidence*, 28 April 2015, 1540 (Prof. Anne-Marie Nicol, Assistant Professor, Faculty of Health Sciences, Simon Fraser University, As an Individual).

51 Brief submitted to the Committee, no date (C4ST).

52 Ibid.

53 Brief submitted to the Committee dated 13 April 2015 (Murray Cunningham, Environmental Health Association of Manitoba).

54 Ibid.

55 Ibid; Brief submitted to the Committee, no date (C4ST); C4ST's recommendation focussed on accommodating individuals with EHS in federal workplaces and areas of federal responsibility.

- allocating resources for research for testing, diagnosis and treatment;⁵⁶ and
- systematically collecting data relating to EHS (via the Canadian Community Health Survey, having physicians report to the Canadian Institute for Health Information and establishing an on-line reporting system for reporting adverse symptoms and triggers).⁵⁷

The Committee agrees that more research into EHS is needed. Specifically, the Committee supports the witness recommendation that better data need to be collected with respect to potential incidences of EHS and that individuals who have symptoms that they attribute to EHS should be supported by the health care system. The Committee therefore recommends

Recommendation 2

That Statistics Canada consider including questions related to electromagnetic hypersensitivity in the Canadian Community Health Survey.

Recommendation 3

That the Government of Canada, through the Canadian Institutes of Health Research, consider funding research into electromagnetic hypersensitivity testing, diagnosis and treatment, and its possible impacts on health in the workplace.

Recommendation 4

That the Canadian Medical Association, the Royal College of Physicians and Surgeons, the College of Family Physicians of Canada and the World Health Organization consider updating their guidelines and continuing education materials regarding the diagnosis and treatment of electromagnetic hypersensitivity to ensure they are based on the latest scientific evidence and reflect the symptoms of affected Canadians.

56 Brief submitted to the Committee dated 13 April 2015 (M. Cunningham, Environmental Health Association of Manitoba); Brief submitted to the Committee, no date (C4ST).

57 See, for example, HESA, *Evidence*, 28 April 2015, 1635 (R. Bray, As an Individual); "RE: Recommendations concerning disease and health conditions surveillance," letter to the Committee dated 14 April 2015 (D. McCutcheon, C4ST).

Recommendation 5

That the Government of Canada continue to provide reasonable accommodations for environmental sensitivities, including electromagnetic hypersensitivity, as required under the *Canadian Human Rights Act*.

Recommendation 6

That Health Canada ensure the openness and transparency of its processes for the review of Safety Code 6, so that all Canadians have an opportunity to be informed about the evidence considered or excluded in such reviews, that outside experts are provided full information when doing independent reviews, and that the scientific rationale for any change is clearly communicated.

Recommendation 7

That the Government of Canada establish a system for Canadians to report potential adverse reactions to radiofrequency fields.

B. Protecting vulnerable populations

As was mentioned earlier, the Expert Panel had recommended that “the proposed reference levels in Safety Code 6 be reviewed by Health Canada to make them somewhat more restrictive in some frequency ranges to ensure a larger safety margin for Canadians, including newborn infants and children.”⁵⁸ Andrew Adams indicated that the Expert Panel’s recommendations “were taken into consideration when finalizing the revised guideline.”⁵⁹

Martha Herbert pointed to differences between children and adults with respect to vulnerability to RF exposure: “Children are not little adults. They are developing, and perturbations during windows of development may have lifelong repercussions.”⁶⁰ Dr. Bray noted that “those at highest risk for EHS include the fetus, children, the elderly, the infirm, those with predisposing morbidities – usually cardiac and neurological – and those with a toxic overload.”⁶¹

Material provided to the Committee by C4ST states that “Safety Code 6 does not provide the extra protection needed for children and pregnant women.”⁶² Carmen Krogh, who recommended that industrial wind energy and solar facilities should be considered in reviews of Safety Code 6, stated that “[w]hile we have to be concerned about the general

58 HESA, *Evidence*, 24 March 2015, 1555 (P. Demers, As an Individual).

59 HESA, *Evidence*, 24 March 2015, 1535 (A. Adams, Health Canada).

60 HESA, *Evidence*, 28 April 2015, 1630 (M. Herbert, As an Individual).

61 HESA, *Evidence*, 28 April 2015, 1530 (R. Bray, As an Individual).

62 “C4ST Fact Sheet”, Canadians For Safe Technology.

population at large, we would like to see priorities given to the fetus and neonatal exposure, as well as babies, children, youth, the elderly, and those with pre-existing medical conditions or disease and special needs.”⁶³

Dr. Havas noted that the nitrogen levels in drinking water are based on protecting infants, and that Safety Code 6 should follow that example by “protecting the most sensitive people within our population.”⁶⁴

Witnesses pointed to measures adopted in other countries to protect vulnerable infants and young children:

- banning Wi-Fi in nurseries and daycares (France);
- prohibiting children under the age of 2 from using electronic devices (Taiwan);⁶⁵ and
- prohibiting the sale and marketing of cell phones to children (Belgium).⁶⁶

Given the testimony that vulnerable groups, such as infants and young children, are being exposed to radiofrequency fields and the fact that other countries have taken protective measures, the Committee recommends

Recommendation 8

That an independent scientific body recognized by Health Canada examine whether measures taken and guidelines provided in other countries, such as France and Israel, to limit the exposure of vulnerable populations, including infants, and young children in the school environment, to radiofrequencies should be adopted in Canada.

C. Exposure in schools

Multiple witnesses and many of the briefs that were submitted to the Committee raised the issue of Wi-Fi in classrooms and schools. As Martin Blank stated,

I particularly worry about the children, because children are sitting in schools six hours a day, five days a week, subject to Wi-Fi that's continuously on. That, I think, is something that doesn't have to be. It may cost a little more to put cables in to supply the same information in the educational programs, but you certainly don't need Wi-Fi to accomplish

63 HESA, *Evidence*, 28 April 2015, 1555 (Carmen Krogh, Independent Health Researcher, As an Individual).

64 HESA, *Evidence*, 23 April 2015, 1610 (M. Havas, As an Individual).

65 “C4ST Suggested recommendations to the Health Committee re Safety Code 6 review,” submitted to the Committee, no date (Canadians for Safe Technology); Letter to the Committee dated 13 April 2015 (Malini Menon).

66 Ibid.

the educational results. I think it's a sin to have this kind of exposure for children when we don't know if it's safe — and many suspect it is not.⁶⁷

Parents of school-aged children expressed concern about their children's exposure to Wi-Fi in school, noting frustration in some cases that their attempts to reduce this exposure were unsuccessful. In her letter, Kristin Morrison wrote:

Concerned families across Canada have encouraged and supported the use of technology in school but asked that boards follow safe practices by utilizing wired internet as opposed to wireless internet or at least minimizing use of wireless devices and turning off WiFi routers when not in use. Unfortunately most Canadian public school boards will not agree to these requests nor will they agree to educate students on the safety instructions that come with wireless devices. They are adamant that there is nothing to worry about because "Health Canada's Safety Code 6 indicates that radiation levels from routers and wireless devices are safe for children and there are no warnings from the Canadian government which would warrant taking precautions."

Marcey Kliparchuk referred to the Canadian Teachers' Federation brief, "The Use of Wi-Fi in Schools" (2014). Ms. Kliparchuk noted that the brief called for Wi-Fi to be turned off when not in use and that there should be resources to educate the public about reducing exposure.

To address concerns relating to children's exposure to Wi-Fi in schools, some witnesses and briefs also recommended that schools rely on wired access use.⁶⁸ Another option would be to have Wi-Fi free zones in schools for children who are sensitive to RF fields or for children whose parents want to limit their children's exposure to RF fields.⁶⁹

In a letter to the Committee, Paulette Rende recommended the establishment of a "National Wireless Device Safety Initiative for Schoolchildren (and all Canadians),"⁷⁰ and Dorethy Luyks recommended that "radiation and electric field measurements need to be monitored in our schools and communities to meet safety standards."⁷¹ Malini Menon stated that "Health Canada should be issuing precautionary directives to provincial education authorities, and strongly discouraging the use of all forms of wireless technology in schools."⁷² She also noted that Israel has established daily and weekly RF exposure limits for children in grades one to three.⁷³ Kristin Morrison made a similar recommendation, noting that school boards should "educate youth on the importance of

67 HESA, *Evidence*, 24 March 2015, 1705 (M. Blank, As an Individual).

68 See, for example, HESA, *Evidence*, 28 April 2015, 1640 (M. Herbert, As an Individual); 1615 (R. Bray, As an Individual).

69 Letter submitted to the Committee dated 14 April 2015 (Marcey Kliparchuk).

70 Letter submitted to the Committee dated 14 April 2015 (Paulette Rende).

71 Letter submitted to the Committee, no date (Dorethy Luyks).

72 Letter submitted to the Committee dated 13 April 2015 (M. Menon).

73 Ibid.

using technology safely.”⁷⁴ Dr. Bray suggested that there should be legislation “to have hard-wiring throughout [schools].”⁷⁵

The Committee agrees that children in schools should be protected from unnecessary exposure to wireless technology, particularly when alternative technologies exist. The Committee therefore recommends

Recommendation 9

That the Government of Canada develop an awareness campaign relating to the safe use of wireless technologies, such as cell phones and Wi-Fi, in key environments such as the school and home to ensure that Canadian families and children are reducing risks related to radiofrequency exposure.

MOVING FORWARD

A. Adopting a precautionary approach

The vast majority of witnesses and briefs recommended lowering the RF exposure limits in Safety Code 6. While no one made recommendations with respect to the actual levels that they would like to see included in Safety Code 6, witnesses referenced countries that had adopted lower levels (Russia, China, Italy and Switzerland). Those witnesses also focused on the need for Health Canada to adopt a precautionary approach when establishing the safe RF exposure limits contained in Safety Code 6.⁷⁶ C4ST recommends that “Health Canada be instructed to recommend precautionary approaches regarding exposures to electromagnetic radiation from wireless communications devices that are as Low as Reasonably Achievable (ALARA).”⁷⁷

Prof. Leszczynski explained that European Union criteria relating to the precautionary principle “are currently fulfilled”:

Number one, scientific information is insufficient, inconclusive, or uncertain to make a firm decision. This is exactly what the IARC classification says on cellphone radiation as a possible human carcinogen, group 2B.

Number two, there are indications that the possible effects to human health may be potentially dangerous. Increased risk of brain cancer in long-term, avid users is a

74 Letter submitted to the Committee dated 13 April 2015 (Kristin Morrison).

75 HESA, *Evidence*, 28 April 2015, 1615 (R. Bray).

76 See, for example, letters submitted to the Committee dated 16 April 2015 (anonymous); 27 April 2015 (Maria Acosta, spokesperson for Basses-Laurentides refuse); 13 April 2015 (M. Menon); 17 April 2015 (Heather Nixon); 20 April 2015 (T. Beck); “C4ST Suggested recommendations to the Health Committee re. Safety Code 6 review”, no date (Canadians for Safe Technology).

77 “C4ST Suggested recommendations to the Health Committee re Safety Code 6 review”, no date (Canadians for Safe Technology).

dangerous outcome, shown by three replicated epidemiological studies: European INTERPHONE, Swedish Hardell group, and French CERENAT studies.

Number three, the effects are inconsistent with the chosen level of protection. Epidemiological studies showing an increased risk in long-term, avid users were generated in populations using regular cellphones meeting all current safety standards. This means that the current safety standards are insufficient to protect users because the risk of developing cancer increases in long-term, avid users.⁷⁸

Frank Clegg from Canadians for Safe Technology pointed out to the Committee that

our track record in North America is not successful regarding such products as tobacco, asbestos, BPA, thalidomide, DDT, urea-formaldehyde insulation, and many others, use of the precautionary principle of prudent avoidance should [therefore] be recommended until the science proves beyond reasonable doubt that there is no potential for harm.⁷⁹

Anthony Miller noted:

Given the long natural history of cancer and the fact that human populations have not been exposed for a sufficient length of time to exclude a carcinogenic effect, it is in my view extremely important to adopt a precautionary approach to the exposure of humans, particularly children, to radio frequency fields.⁸⁰

Dr. Bray suggested that it is imperative to use precaution and put protective measures in place rather than wait for more studies.⁸¹

As was mentioned earlier, Paul Demers noted that the panel concluded that Safety Code 6 avoided established health effects.⁸²

Those individuals who were of the opinion that Safety Code 6's current levels are sufficiently protective and that greater precaution is unwarranted included Prof. Tarzwell, Bernard Lord and Tom Whitney.⁸³ A brief from the U.S.-based Telecommunications Industry Association recommends that some exposure limits in Safety Code 6 are, in fact, too restrictive and are no longer consistent with international standards.⁸⁴ Bernard Lord

78 HESA, *Evidence*, 23 April 2015, 1645 (D. Leszczynski)

79 HESA, *Evidence*, 23 April 2015, 1530 (F. Clegg, C4ST).

80 HESA, *Evidence*, 23 April 2015, 1535 (A. Miller, As an Individual).

81 HESA, *Evidence*, 28 April 2015, 1600 (R. Bray, As an Individual).

82 HESA, *Evidence*, 24 March 2015, 1555 (P. Demers, As an Individual).

83 "Brief to the House of Commons Standing Committee on Health," 28 April 2015 (Tom Whitney).

84 "Re: Telecommunications Industry Association (TIA) Brief to the Standing Committee on Health on Health Canada's Safety Code 6," 28 April 2015 (Brian Scarpelli, Director, Government Affairs, Telecommunications Industry Association).

stated that “[the precautionary approach] is applied by the standards that are set by Safety Code 6 and Health Canada.”⁸⁵

One brief noted the concern that “Safety Code 6 does not adequately deal with Near and Intermediate Field Radiation.”⁸⁶

B. The need for more research

Many witnesses and briefs referred to the need for more research into the effects of exposure to RF fields,⁸⁷ including research into EHS (discussed above). As was mentioned earlier, Dr. Prato noted that the report of the Expert Panel on Safety Code 6 also recommended that Health Canada pursue research relating to the effects of RF exposure at levels below the limits in Safety Code 6.⁸⁸

Dr. Demers stated that, in the Expert Panel’s report, “each section on a particular health effect usually ends by basically pointing out that more research is needed on that health effect.”⁸⁹ Dr. Prato also stated that research is still needed with respect to non-thermal effects of RF exposure.⁹⁰

Dr. Sears stated that environmental health data (both exposures and health outcomes) and detailed cancer incidence data need to be collected. She also recommended that “Health Canada ... systematically access, assess and act upon all the science from scratch. It needs specific tools as well as methodological and library expertise to accomplish this.”⁹¹ C4ST recommended that “Health Canada conduct a comprehensive systematic review according to international best practices of the current scientific evidence on potential risks to human health caused by EMR.”⁹²

Andrew Adams agreed that more research is needed into the potential link between RF fields and carcinogenicity,⁹³ and Bernard Lord stated that the CWTA “... continue[s] to support and encourage more scientific research, if it is warranted and desired.”⁹⁴

85 HESA, *Evidence*, 28 April 2015, 1700 (B. Lord, President and Chief Executive Officer, Canadian Wireless Telecommunications Association).

86 Letter to the Committee dated 13 April 2015 (Norm Ryder).

87 See, for example, letters dated 27 April 2015 (M. Acosta); 13 April 2015 (M. Cunningham, Environmental Health Association of Manitoba).

88 HESA, 24 March 2015, 1545 (F. Prato, Lawson Health Research Institute).

89 HESA, 24 March 2015, 1600 (P. Demers, As an Individual).

90 HESA, 24 March 2015, 1545 (F. Prato, Lawson Health Research Institute).

91 HESA, *Evidence*, 24 March 2015, 1650 (M. Sears, As an Individual).

92 “C4ST Suggested recommendations to the Health Committee re Safety Code 6 review,” submitted to the Committee, no date (Canadians for Safe Technology).

93 HESA, *Evidence*, 24 March 2015, 1625 (A. Adams, Health Canada).

94 HESA, *Evidence*, 28 April 2015, 1710 (B. Lord, Canadian Wireless Telecommunications Association).

The Committee agrees that a more careful review of the existing literature relating to the potential link between RF fields and carcinogenicity is needed and that further research into the possibility of such a link also needs to be examined. The Committee therefore recommends

Recommendation 10

That Health Canada conduct a comprehensive review of all existing literature relating to radiofrequency fields and carcinogenicity based on international best practices.

Recommendation 11

That the Government of Canada, through the Canadian Institutes of Health Research, consider funding research into the link between radiofrequency fields and potential health effects such as cancer, genetic damage, infertility, impairment to development and behaviour, harmful effects to eyes and on the brain, cardiovascular, biological and biochemical effects.

C. Increasing public awareness about the potential risks of exposure to RF from wireless devices and how to reduce individual exposure

Prof. Nicol referred to the need for greater awareness of RF fields on the part of the general public:

On the topic of exposure, it's very clear that most people have very little understanding of what radio frequency is. Most people do not realize that this is a question of proximity. They're very concerned about the ubiquity of exposure without an understanding that the closer a technology is to your body, the more dangerous it possibly could be to you. This is a question of proximity and a question of education. Given the ubiquity of radio frequency in our society, I do find it amazing that we are not doing a very good job either in the public school system, or in general, of discussing what RF is.⁹⁵

Many of the witnesses who wanted to see the safe exposure levels in Safety Code 6 lowered wanted measures to be taken to increase public awareness about the potential risks of exposure to RF. For example, C4ST recommends that "Health Canada conduct a national campaign to educate Canadians about methods to minimize exposure to RF radiation,"⁹⁶ and the Environmental Health Association of Manitoba recommends the establishment of public education programs "to make people aware of how to take preventative measures."⁹⁷ Andrew Adams confirmed that, while information about RF

95 HESA, *Evidence*, 28 April 2015 (A.-M. Nicol, As an Individual).

96 "C4ST Suggested recommendations to the Health Committee re Safety Code 6 review," submitted to the Committee, no date (Canadians for Safe Technology).

97 Letter submitted to the Committee dated 13 April 2015 (M. Cunningham, Environmental Health Association of Manitoba).

fields is posted on its website, Health Canada does not “have any programs to educate young people and families about the effects of electromagnetic fields.”⁹⁸

Some witnesses also proposed ways in which individuals could limit their exposure to RF. Measures for reducing exposure included

- Keeping cell phones away from the head by using the speaker or air tube earbuds;⁹⁹
- Using wired phones in the home instead of cordless ones;¹⁰⁰
- Using an Ethernet connection instead of Wi-Fi in the home;¹⁰¹
- Putting Wi-Fi on a timer so that it is not on while you are sleeping;¹⁰²
- For children, keeping iPads on “airplane mode” or using an Ethernet connection;¹⁰³
- For pregnant women, keeping wireless devices away from the abdomen;¹⁰⁴ and
- For men, not carrying cell phones in a front pants pocket.¹⁰⁵

The Committee agrees that the potential risks of exposure to RF fields are a serious public health issue that needs to be brought to the attention of Canadians so that they have the knowledge to use wireless devices responsibly and are able to make decisions about the use of wireless devices in a manner that protects their health and the health of their families.

98 HESA, *Evidence*, 24 March 2015, 1610 (A. Adams, Health Canada).

99 “Public Health and Education Campaign to Reduce Exposure to Wireless Radiation,” brief submitted to the Committee, no date (Wendy Cockburn, Canadians for Safe Technology).

100 HESA, *Evidence*, 23 April 2015, 1615 (M. Havas, As an Individual).

101 Ibid.

102 HESA, *Evidence*, 23 April 2015, 1620 (F. Clegg, Canadians for Safe Technology).

103 Ibid.

104 “Public Health and Education Campaign to Reduce Exposure to Wireless Radiation,” brief submitted to the Committee, no date (W. Cockburn, Canadians for Safe Technology).

105 HESA, *Evidence*, 23 April 2015, 1610 (F. Clegg, Canadians for Safe Technology).

D. How industry can help reduce exposure to radiofrequencies

Bernard Lord stated that “the wireless sector in Canada as well as around the world is committed to a completely open process in the study of health and safety issues related to wireless technologies.”¹⁰⁶ He explained that the sector he represents adheres “to the science based safety standards enforced by the Government of Canada and set by the Government of Canada.”¹⁰⁷ Mr. Lord was of the opinion that the standards set by Safety Code 6 “keep us safe and that when you use the devices under the limits that are set, they are believed to be safe in Canada and around the world.” He indicated that it would be easy to comply with “not advertising devices to a certain group of the population.”¹⁰⁸

In a follow-up response to Mr. Lord’s appearance, Kurt Eby, Director of Regulatory Affairs and Government Relations for the Canadian Wireless Telecommunications Association, stated that “CWTA is not aware [of] any country where the wireless industry had to make any significant or widespread adjustments to comply with existing or new EMF emission regulations.”¹⁰⁹

Frank Clegg proposed that industry needs to be challenged to come up with effective ways to work:¹¹⁰

We have technology in Europe. The industry is not jamming it or trying to go through the process to get it into Canada because they don't need to. The industry will respond, it will react, and it will act responsibly if we set the challenge in front of it. I think we're missing that opportunity to go to the industry to lower the standards on Safety Code 6. If we did that, industry would react and provide better products.

...

If you go to the technology industry and tell them they are no longer allowed to sell wireless tablet devices to schools, you will immediately have many solutions that are wired. So challenge. I'm asking the community to challenge my industry to do a better job.

Devra Davis noted that “Industry has advice about how to use [tablets], and I applaud them because recently they've become more forthright with advice ... about how to use these things safely.”¹¹¹

106 HESA, *Evidence*, 28 April 2015, 1650 (B. Lord, Canadian Wireless Telecommunications Association).

107 *Ibid.*

108 HESA, *Evidence*, 28 April 2015, 1715 (B. Lord, Canadian Wireless Telecommunications Association).

109 Letter submitted to the Committee, 7 May 2015 (Kurt Eby, Director, Regulatory Affairs and Government Relations, Canadian Wireless Telecommunications Association).

110 HESA, *Evidence*, 23 April 2015, 1625 (F. Clegg).

111 HESA, *Evidence*, 28 April 2015, 1640 (D. Davis).

Witnesses, including Magda Havas, noted that European consumers can purchase cordless phones and baby monitors that are voice-activated rather than being on and emitting RF radiation 24 hours a day. The Committee heard that these types of devices are not available in the United States or Canada.

Given some of the concerns expressed by witnesses relating to the use of radiation emitting devices by children, the Committee recommends

Recommendation 12

That the Government of Canada and manufacturers consider policy measures regarding the marketing of radiation emitting devices to children under the age of 14, in order to ensure they are aware of the health risks and how they can be avoided.

LIST OF RECOMMENDATIONS

Recommendation 1

That the Government of Canada, in collaboration with the health departments of the provinces and territories, examine existing cancer data collection methods to improve the collection of information relating to wireless device use and cancer. 10

Recommendation 2

That Statistics Canada consider including questions related to electromagnetic hypersensitivity in the Canadian Community Health Survey. 14

Recommendation 3

That the Government of Canada, through the Canadian Institutes of Health Research, consider funding research into electromagnetic hypersensitivity testing, diagnosis and treatment, and its possible impacts on health in the workplace. 14

Recommendation 4

That the Canadian Medical Association, the Royal College of Physicians and Surgeons, the College of Family Physicians of Canada and the World Health Organization consider updating their guidelines and continuing education materials regarding the diagnosis and treatment of electromagnetic hypersensitivity to ensure they are based on the latest scientific evidence and reflect the symptoms of affected Canadians. 14

Recommendation 5

That the Government of Canada continue to provide reasonable accommodations for environmental sensitivities, including electromagnetic hypersensitivity, as required under the *Canadian Human Rights Act*. 15

Recommendation 6

That Health Canada ensure the openness and transparency of its processes for the review of Safety Code 6, so that all Canadians have an opportunity to be informed about the evidence considered or excluded in such reviews, that outside experts are provided full information when doing independent reviews, and that the scientific rationale for any change is clearly communicated. 15

Recommendation 7

That the Government of Canada establish a system for Canadians to report potential adverse reactions to radiofrequency fields. 15

Recommendation 8

That an independent scientific body recognized by Health Canada examine whether measures taken and guidelines provided in other countries, such as France and Israel, to limit the exposure of vulnerable populations, including infants, and young children in the school environment, to radiofrequencies should be adopted in Canada. 16

Recommendation 9

That the Government of Canada develop an awareness campaign relating to the safe use of wireless technologies, such as cell phones and Wi-Fi, in key environments such as the school and home to ensure that Canadian families and children are reducing risks related to radiofrequency exposure. 18

Recommendation 10

That Health Canada conduct a comprehensive review of all existing literature relating to radiofrequency fields and carcinogenicity based on international best practices..... 21

Recommendation 11

That the Government of Canada, through the Canadian Institutes of Health Research, consider funding research into the link between radiofrequency fields and potential health effects such as cancer, genetic damage, infertility, impairment to development and behaviour, harmful effects to eyes and on the brain, cardiovascular, biological and biochemical effects. 21

Recommendation 12

That the Government of Canada and manufacturers consider policy measures regarding the marketing of radiation emitting devices to children under the age of 14, in order to ensure they are aware of the health risks and how they can be avoided..... 24

APPENDIX A LIST OF WITNESSES

Organizations and Individuals	Date	Meeting
<p>As an individuals</p> <p>Martin Blank, Special Lecturer, Department of Physiology and Cellular Biophysics, Columbia University</p> <p>Paul Demers, Director, Occupational Cancer Research Centre, Cancer Care Ontario</p> <p>Frank Prato, Imaging Program Leader, Lawson Health Research Institute</p> <p>Meg Sears, Adjunct Investigator, Children's Hospital of Eastern Ontario Research Institute</p> <p>Department of Health</p> <p>Andrew Adams, Director General, Environmental and Radiation Health Sciences Directorate</p> <p>James McNamee, Chief, Health Effects and Assessments Division, Healthy Environments and Consumer Safety Branch</p> <p>Department of Industry</p> <p>Dan Duguay, Director General, Engineering, Planning and Standards Branch</p> <p>Peter Hill, Director General, Spectrum Management Operations Branch</p>	2015/03/24	54
<p>As an individuals</p> <p>Magda Havas, Professor, Environmental and Resource Studies, Trent University</p> <p>Dariusz Leszczynski, Adjunct Professor, Department of Biosciences, University of Helsinki</p> <p>Anthony Miller, Professor Emeritus, Dalla Lana School of Public Health, University of Toronto</p> <p>Rob Tarzwell, Clinical Assistant Professor, Faculty of Medicine, University of British Columbia</p> <p>Canadians For Safe Technology</p> <p>Frank Clegg, Chief Executive Officer, C4ST</p>	2015/04/23	57
<p>As an individuals</p> <p>Riina Bray, Medical Director, Environmental Health Clinic, Women's College Hospital, Maple, Ontario</p> <p>Beth Harrington, Independent Health Researcher</p>	2015/04/28	58

Organizations and Individuals	Date	Meeting
Martha Herbert, Assistant Professor Neurology, Harvard Medical School, Massachusetts General Hospital	2015/04/28	58
Carmen Krogh, Independent Health Researcher		
Anne-Marie Nicol, Assistant Professor, Faculty of Health Sciences, Simon Fraser University		
Canadian Wireless Telecommunications Association		
Kurt Eby, Director, Regulatory Affairs		
Bernard Lord, President and Chief Executive Officer		
Canadians For Safe Technology		
Frank Clegg, Chief Executive Officer, C4ST		
Environmental Health Trust		
Devra Davis, President and Founder		

APPENDIX B LIST OF BRIEFS

Organizations and Individuals

Basses-Laurentides Refuse

Beck, Tammy

Bray, Riina

Canadians For Safe Technology

Environmental Health Association of Manitoba

Environmental Health Trust

Flynn, Jerry

Friesen, Margaret

Gagachev, Vladimir V.

Harrington, Beth

Havas, Magda

Herbert, Martha

Héroux, Paul

Hoffmann, Janis

Kawartha Safe Technology Initiative

Kliparchuk, Ann

Kliparchuk, Marcey

Krogh, Carmen

Leszczynski, Dariusz

Luyks, Dorethy

McCallum, Charlotte

Menon, Malini

Miller, Anthony

Organizations and Individuals

Morrison, Kristin

Moskowitz, Joel

Nixon, Heather

Quebec's Coalition Against Electromagnetic Pollution

Rende, Paulette

Ryder, Norm

Sears, Meg

Shimoda, Gina

Strain, Teri

Telecommunications Industry Association

Whitney, Tom

REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* ([Meetings Nos. 54, 57, 58, 59 and 66](#)) is tabled.

Respectfully submitted,

Ben Lobb

Chair

