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(screen shot of the pre-download webpage is the final page of this unofficial transcript)

C: = Chair
A: = Andrew Adams
P: = Frank Prato
D: = Paul Demers
N: = James McNamee
H: = Peter Hill
S: = Margaret Sears
B: = Martin Blank
M: = unknown speaker, seems to be male voice
W: = unknown speaker, seems to be female voice
?: = unknown speaker
00:00 = any timemarks are minutes:seconds
[] = notes from the transcriber
ct = more than one person speaking
(??) = transcriber is unsure of the word or spelling

[transcript begins at 00:39 in the English recording, 00:53 in the Floor recording; any timemarks below refer to the English recording unless otherwise noted]

C: Good afternoon, ladies and gentlemen. We're here to begin our brief study on Health Canada's *Safety Code 6*. We have a number of witnesses here today, two panels, and we have some Department officials here today. Who would like to go first with the Department officials? Okay, Mr. Adams, go ahead, sir.

A: Okay. Thank you very much. I have some opening remarks to... to make. So, Chairman and Members of the Committee, it is my pleasure to be here today to speak on Health Canada's *Safety Code 6*. My name is Andrew Adams, and I'm the Director of the Environmental and Radiation Health Sciences Directorate in the Healthy Environments and Consumer Safety Branch of Health Canada. I'm joined today by Dr. James McNamee, Chief of... Chief of the Health Effects and Assessments Division in the Consumer and Clinical Radiation Protection Bureau and the lead author of *Safety Code 6*. *Safety Code 6* is Health Canada's guideline for exposure to radiofrequency, or RF, electromagnetic energy—the kind of energy given off by cellphones and WiFi as well as broadcasting and cellphone towers. *Safety Code 6* provides human exposure limits in the 3 kilohertz to 300 gigahertz frequency range. And we have provided a Chart A of the electromagnetic spectrum, just so Committee Members can situate the frequency range we're talking about. But *Safety Code 6* does not cover exposure to electromagnetic energy in the optical or ionizing radiation portions of the electromagnetic spectrum. *Safety Code 6* establishes limits for human... for safe human exposure to RF energy. These limits incorporate large safety margins to protect the health and safety of all Canadians, including those who work near RF sources. [A few words in French language.] [Live translation begins.] Although the *Safety Code 6* does recommend limiting exposures for humans, Health Canada does not regulate exposure for the... for the public to RF electromagnetic energy. Industry Canada is the regulatory agency for telecommunication

and broadcasting facilities in Canada. In order to ensure that exposure of the public remains within acceptable limits, Industry Canada has developed regulatory standards that require exposing, or rather, limiting exposure of the human body as per *Safety Code 6*. [Translation ends.] I'd like to talk a little bit about the approach for updates to *Safety Code 6*. *Safety Code 6* is reviewed on a regular basis to verify that the guideline provides protection against all known potentially harmful health effects and that it takes into account recent scientific data from studies carried out worldwide. The most recent update to *Safety Code 6* was completed earlier this month. I will describe the process used for that update, later in my remarks. When 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, and employed a weight-of-evidence approach when evaluating possible health risks from exposure to RF energy. The weight-of-evidence approach takes into account both the quantity of studies on a particular endpoint as well as the quality of those studies. Poorly conducted studies receive relatively little weight, while properly conducted studies received more weight. Now, focusing on the recent update of *Safety Code 6*. [A few words in French language.] [Live translation begins.] Most recent update to *Safety Code 6* was undertaken in 2012, in order to ensure that... that the most recent, credible scientific data on the potential effects of RF energy on human health were taken into account in the *Code*. Health Canada had proposed amending the *Code* according to the most recent scientific data, including improving the modelization of the interactions of RF fields with the human body and harmonizing the *Code* with the exposure limits as defined by the International Commission for Protection Against Non-Ionizing Radiation, or CIPRNI[sic, French acronym]. These changes had been proposed so that the security margins be maintained to protect the health and safety of all Canadians, including newborns and children. [Translation ends.] Some of you may recall that this Committee previously conducted a study on the potential health impacts of RF electromagnetic radiation. Among the recommendations included in the Committee's December 2010 Report was a recommendation 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. In response to this recommendation, in 2013, Health Canada contracted the Royal Society of Canada to review the results of emerging research relating to the safety of RF energy on human health, to ensure it was appropriately reflected in the revised safety code, through a formalized Expert Panel process. And I'm sure you know that today we're joined by the Chair of the Expert Panel and one of the Members of the Expert Panel. The Expert Panel of the Royal Society released their Review in March 2014, concluding that, "In the view of the Panel, there are no established adverse health effects at exposure levels below the proposed limits." Among the recommendations made by the Expert Panel, it was suggested that the proposed reference levels in the *Draft Safety Code 6* be made slightly more restrictive in some frequency ranges, to ensure larger safety margins for all Canadians, including newborn infants and children. [A few words in French language.] [Live translation begins.] ... reasons of openness and transparency, Health Canada also conducted, between May and July 2014, a public consultation, that lasted 60 days, on the proposed amendments to *Safety Code 6*. The Department invited Canadians and stakeholders to participate by making comments, by... by providing their comments. Comments on the technical and scientific aspects of *Safety Code 6* received by Health Canada during this public consultation, as well as the recommendations made by the Royal Canadian... Royal Society of Canada's Expert Panel, were taken into account when updating the most recent version of the guideline. [Translation ends.] The final *Safety Code 6* was published on March 15th, 2015. Health Canada also published a summary of the feedback received during the public consultation period. Given the scientific basis of the guideline, only feedback of a technical or scientific nature could be considered in the finalization of *Safety Code 6*. However, the summary of consultation feedback responds to both technical and non-technical comments received from Canadians. [A few words in French language.] [Live

translation begins.] Thanks(?) to(?) this recent update, Canadians can be... may be assured that exposure limits to radiofrequencies, as established in *Safety Code 6*, are now amongst the limits based on scientific data that are amongst the most rigorous in the world. [Translation ends.] Just to shift a little bit and talk about the scientific methodology that... that underlies the revision of *Safety Code 6*. A large number of submissions received during the public consultation period raised concerns that Health Canada had not considered all of the relevant literature when updating *Safety Code 6*. In particular, it has been stated that 140 studies were ignored. I would like to... I would like to address that criticism, here today. 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 of... 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. I believe we have provided links to some of these reports for the Committee’s interest. [A few words in French language.] [Live translation begins.] [In progress] although safety... even though *Safety Code 6* does make... refer to these international analyses, it is a guideline with respect to exposure, rather than an exposé of scientific... rather than a scientific summary. So. Therefore, most of the scientific studies were not... are not cited in the *Code*. This does not mean that Health Canada did not take it... into account all the information that was relevant. But(?) I assure you that we did. [Translation ends.] 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 appropriate controls, 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... 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. [A few words in French language.] [Live translation begins.] [Live translation begins.] [In progress] however, Health Canada did take into account all the studies that were reviewed by... that were reviewed and that were of sufficient quality to be included in our risk assessment. Although it is true that some studies revealed biological effects or harmful effects of RF fields, that they’re under the levels established and allowed in the *Safety Code 6*, I must emphasize that these studies are very few and that they do not represent the predominant source of data. [Translation ends.] The conclusions reached by Health Canada are consistent with reviews of the scientific evidence by national and international health authorities. Of note, the European Commission’s Scientific Committee on Newly Emerging Identified Health Risks released its final opinion on the potential health effects of electromagnetic fields earlier this month. S-C-E-N-I-H-R concluded that there are no evident adverse health effects provided exposure levels below... remain below levels recommended by European Union legislation. Now I’d like to talk a little bit about an international comparison. Members of the Committee may be wondering how the limits in *Safety Code 6* compare to limits in other parts of the world. I refer you to the chart of radiofrequency exposure limits for the general public in different countries. Internationally, a few jurisdictions have applied more restrictive limits for RF field exposures from celltowers, however, there is no scientific evidence to support the need for such restrictive limits. Canada’s limits are consistent with, if not more stringent than, the science-based limits used in other jurisdictions, such as the European Union, the United States, Japan, Australia, and New Zealand. In conclusion, the health of Canadians is protected from radiofrequency electromagnetic energy when the human exposure limits recommended in *Safety Code 6* are respected. *Safety Code 6* has always established and maintained a human exposure limit that is far below the threshold for potentially adverse health effects. The health of Canadians was protected under the previous version of *Safety Code 6*, and recent revisions to the *Code* ensure even greater protection.

Health Canada will continue to monitor the scientific literature on this issue, on an ongoing basis. Should new evidence arise that indicates a risk to Canadians at levels below the limits in *Safety Code 6*, the Department would take appropriate action. [A few words in French language.] [Live translation begins.] I appreciate the Committee's attention.

C: Thank you.

C: Dr. Prato, can you hear us okay?

P: Yes, I can. Thank you.

C: Okay. Go ahead, sir. You have some prepared statement or comments?

P: I'm first, then?

C: Yes. You can go ahead, sir.

P: Okay. I'm... my name... my name is Frank Prato. I'm an Assistant Scientific Director and Medical Imaging Program Leader at the Lawson Health Research Institute. The Lawson Health Research Institute is one of the largest hospital-based research institutes in Canada and is the research institute for the two teaching hospitals in London, Ontario. I became interested, in 1982, in non-ionizing, non-thermal effects, when I introduced, here in Canada, magnetic resonance imaging. We produced the first image in Canada using magnetic resonance imaging in 2000... in 1982. And I became interested in the potential of non-thermal effects as a result of exposure of biological systems to non-ionizing electromagnetic fields. I have continued to work in this area. And I have published about 100 publications. I have some, ah, credentials in terms of international credentials. I'm the Past President of the Bioelectromagnetic Society, which is the largest society investigating non-ionizing radiation, electromagnetic radiation. I'm chairing, for the seventh year now, the Canadian National Committee of the Union of Radio Science International, which is a National Research Council of Canada Committee, which is a committee of a scientific union called the Union of Radio Science International. This Union looks at applications of non-ionizing electromagnetic radiation. And for the Union, worldwide, I was a Commission Chair for Commission K(??) that looks at biological effects of exposure to a non-ionizing radiation. Given this background, I've been very interested. But my interest generally falls outside of the frequency limits associated with *Safety Code 6*, which start at 3 kilohertz. Most of my interest has been at lower frequencies in what is called the ELF range—extremely-low frequency range—which is around 300 hertz and lower, that includes things like 50 and 60 hertz associated with power transmission, electrical power transmission. However, in this area, I've noticed recently.... For example, I published in the *International Journal of Radio*... international journal of the Royal Society, called *Interface*, in 2013, that 30 hertz exposures—that is, again, well below the two... 3 kilohertz associated with *Safety Code 6*—that, ah, ambient electromagnetic fields generated by humans do have effects on biological systems. This is needed to... this was... were experiments that needed to be carried out under shielded conditions. However, they are not relevant, because they fall below the frequency limits associated with *Safety Code 6*. So I'd like to say a few words about: what about non-thermal RF effects below *Safety Code 6* limits within the frequency range? There have been a number of problems with this literature—as, ah, Mr. Adams alluded to. There were three major problems with this literature, at this point in time. One is that the effects have been small. That there is no established mechanism. And in fact, there are a number of people who claim that there are no possible mechanisms with such... with such weak energy

fields. And there are issues with reproducibility. Reproducibility issues aren't surprising, giving that we don't really understand the mechanism. However, very recently published in *Nature* on May 15th, 2014—that's after the release of our Review, our Royal Society Review—there is a most recent article, and I'll read you the title of that article that appeared in *Nature*: "Anthropogenic Electromagnetic Noise Disrupts Magnetic Compass Orientation In A Migratory Bird." So this is clear, non-thermal effects of RF within the... the range of *Safety Code 6* safety. So ah, now we are getting more and more literature which suggests that very weak fields below the limits set by *Safety Code 6* can have biological effects. Of course, we don't know if these effects occur in humans. And we... we are not stating that they are detrimental. They were obviously detrimental to the birds in the, ah, urban population, because it interfered with their ability to sense the Earth's magnetic field for proper orientation and homing. So the question arose with respect to the discussions that occurred for the Royal Society committee on *Safety Code 6* is why we cannot set limits for non-thermal effects. And I draw you to a Section 7.8.8(??, 18:19), last paragraph. And it basically says it is not known how the reported effects scale with exposure parameters. So with, ah, heating effects there's a very straightforward metric that we can evaluate and determine what the energy deposition is and what the probability is that the exposed, ah, tissue or the exposed organism will have a detrimental, perhaps, increase in temperature. But we do not know what the scaling metric is for these non-ah-thermal biological effects. And by "non-thermal," that was also discussed in... in the Report, our Royal Society Report. And I'll remind you that in that Report we basically said that this... this... this definition of "non-thermal" is a bit difficult, but at least we can talk about effects *below* the limits for *Safety Code 6* as being those that would include non-thermal effects. Also, I'd like to point out that in Section 10.2 of the Royal Society Review, the second-last bullet, basically said that Health Canada should pursue research to expand our current understanding of possible effects of exposure to RF energy at levels below *Safety Code 6*. So what I'm saying is, as a researcher, is that there are now well-established effects in *some* animals of, ah, exposures below those of *Safety Code 6*. There's no evidence, at this point in time... no strong evidence, there is some evidence but no strong evidence, that similar effects are reliably reproduced in humans. Also, there's no evidence that these effects would be detrimental to humans if, in fact, they occurred. *But* let me point out that the more recent literature that has come out in the last six months or so, and it was build... some literature building up to that, suggests that some of the studies are quite flawed in this area, because it turns out that magnetic and electric fields produced in the environment do have biological effects and when people had been doing experiments—like exposing one group of individuals to cellphone, ah, exposure and another group just in the lab without cellphone exposure but, say, sham cellphone exposure—they're still being exposed to magnetic and electric fields which are in the environment. And we have evidence now in animals that *those*, ah, magnetic fields generated by humans do have biological effects in a number of species, including mice and... and birds. So that's basically what I'm saying. I'm trying to explain why at this point in time there's not enough information to even consider setting limits for non-thermal effects, because the mechanism is not known and therefore we don't know how the effect *scales*. It... it may not scale at all with respect to the intensity of the exposure. So ah, in my... from my point of view and from my knowledge in this area, what I'd like to answer—if there are questions—I'd like to respond to the... the... the Royal Society Review with respect to Section 6.5—which dealt with magnetic resonance imaging—with Section 7.8—which deals with low-level and non-thermal effects—with Section 7.9—which is possible effects on stress protein expression—and with Section 10.2—the last bullets, only, which are the summary of the recommendations for which I have already alluded to or referenced to. And of course, I would be willing to answer questions in terms of what research still needs to be done for, ah, quote, "non-thermal effects," unquote. And that's my statement.

C: Okay. Thank you, very much.

C: Next up, we have Dr. Paul Demers. Go ahead, sir.

D: Thank you, Mr. Chair and Honourable Members of the Committee for inviting me here today. I know I have been asked to come here today because I chaired the Expert Panel of the Royal Society of Canada on *Safety Code 6*, but I thought I'd start by just saying a few other things about my background. I'm the Director of the Occupational Cancer Research Centre, which is based in Cancer Care Ontario, which is a provincial agency, and which is also funded by the Ontario Ministry of Labour and the Canadian Cancer Society. And I'm also a member of the faculty of the Schools of Public Health of the University of Toronto and the University of British Columbia. I am an epidemiologist, so I study impacts on populations of... of people, of different types of health effects. But my primary area of research is on the risk of cancer associated with workplace chemicals, dust, and radiation; although, I've actually done research in a number of other types of diseases as well as environmental exposures. However, I do want to state that, unlike Dr. Prato, I'm not an expert in... specifically in the area of electromagnetic fields. And I've never actually done research on radiofrequency radiation. As you know, at the request of Health Canada, the Royal Society convened an Expert Panel to conduct a... a Review of the 2013 Draft of *Safety Code 6*. I was asked to chair that Panel because I had no conflicts of interest and because of my expertise in cancer epidemiology, which was identified as... as one of the areas that they wanted expertise on the Panel. I was also asked because of my experience sitting on similar panels for the International Agency for Research on Cancer, the U.S. National Toxicology Program, the U.S. Institute of Medicine—which is part of the National Academy of Sciences, and the Council of Canadian Academies—the latter two being fairly similar to the Royal Society of Canada in how they operate. I should also mention—although you probably may be aware—that I was the second Chair of the Panel. The first Panel[sic] retired... or not retired but resigned because of a perceived conflict of interest. And I took over as Chair of the Panel about midway... midway through. But I do also want to state that I'm here as an individual and I'm not representing the Royal Society of Canada, ah, or any other organization at this point. The Panel was actually presented with five specific questions, and I'm going to go over, very briefly, our responses to those five questions. Overall, they were all dealing with whether or not there were any established health effects at levels below those recommended by *Safety Code 6*, and related types of questions. To answer these questions, we did a review—recently published studies in the area of a wide range of different types of health effects. We also looked at many of the international reviews that, I think, have already been mentioned here today. And these are being conducted on a pretty regular basis by many agencies around the world. We, ah, actually defined... because we were asked to look at... in particular at established health effects, we actually defined an established adverse health effect as something that has been seen, ah, consistently, or been observed consistently, in multiple studies, ah, with strong methodologies. So we had a kind of a... a fairly flexible definition of that. But still it did require not just being observed as a single study. The, ah... before I get into the questions—because I'm going to actually read out the questions that we were given—I wanted to explain two different terms that are used quite a bit in those questions, which is that... that of the definition of what “basic restrictions” are or “reference levels.” “Basic restrictions,” ah, in *Safety Code 6* are actually things that happen within the body. That would be either heating, or induced fields within the bodies, or things like that. And so many of the... the actual limits are set based upon that. Because that's not easily measured, they use also “reference levels,” which are things you can measure outside of the body using a... a meter, so they're much more easy for regulatory purposes. But you'll see often that the questions are phrased in terms of these “basic restrictions” and “reference levels.” So our first question was: “Do the basic restrictions specified in *Safety Code 6* provide adequate protection for both workers and the general population from established adverse health effects from radiofrequency fields?” And our

conclusion, ah, ah, to that was, yes, that they did provide that protection. Ah, specifically *Safety Code 6* was designed to protect against two kinds of established health effects: thermal effects, and peripheral nerve stimulation. The margins of safety, ah, we concluded were both... both at least appeared to be quite protective. For peripheral nerve stimulation it was a safety factor of: 5 for the workplace or controlled environments; and 10-fold for uncontrolled environments, which are more what you would experience in the general public. For thermal effects, they were 10-fold for workplaces and 50-fold for the general public. The second question that we were given was: "Are there any other established adverse health effects occurring at exposure levels below the basic restrictions in *Safety Code 6* that should be considered in revising *Safety Code 6*?" Our conclusion to that question was, no. The Panel reviewed the evidence for a wide variety of health effects—including cancer, cognitive and neurologic effects, male and female reproductive effects, development effects, cardiac function, heart rate variability, electromagnetic hypersensitivity, and adverse effects in susceptible areas of the eye—and although in research on many of these areas—important research, I think—continues, ah, we actually, ah, were unable to identify any adverse health effects occurring at levels below those allowed by *Safety Code 6*. Our third question related specifically to the eye: "Is there sufficient scientific evidence upon which to establish separate basic restrictions or recommendations for the eye?" And we concluded, no, that there weren't sufficient evidence. Recent studies did not show adverse health effects in susceptible regions of the eye at exposure levels below those proposed in *Safety Code 6* for the head, and the neck, and the trunk. Therefore, we recommended that it not contain separate basic restrictions for the eye. The fourth question was, perhaps, a bit more complex. It's: "Do the reference levels established in *Safety Code 6* provide adequate protection against exceeding the basic restrictions?" So that is, ah, do the levels that are proposed as limits for things you can measure outside the body actually protect against the target health effects that are trying to be prevented with inside the body? And our conclusion was that for most frequencies, ah, yes, reference levels were adequate but that there were some regions where compliance, ah, with the reference levels may not ensure compliance with, ah, the basic restrictions. We recommend that the proposed... we recommended that the proposed reference levels in *Safety Code 6* be reviewed by Health Canada to make, ah, them somewhat more restrictive in some frequency ranges to ensure a larger safety margin for Canadians, including newborn infants and children. This recommendation took into account recent, ah, studies that we call "dosimetry studies," ah, ah, at least one of which that was published after, ah, Health Canada had actually produced the proposed *Safety Code 6*. And then our fifth question was: "Should additional precautionary measures be introduced into *Safety Code 6* exposure limits?" And ah, I'll state that although there were a range of *opinions* on the Panel regarding precautionary efforts, overall the Panel believed that *Safety Code 6* were well designed to avoid established health effects, and we did not have any science-based recommendations for precautionary measures to lower the limits. Ah, and I'll say, it was for the reasons that, I think, Dr. Prato, ah, explained quite well: that we couldn't, at least in looking at the studies, say, "Okay, the evidence tells us that we would lower it in... in such a fashion." However, we did recommend a number of other measures that can and should be taken by Health Canada. And I'll read some of them here, now. Investigate the problems of individuals with, what's called, electromagnetic hypersensitivity—it goes by other names as well: IEI-EMF, and things like that—with the aim of understanding their health conditions and finding ways to provide effective treatment. To develop a procedure for the public to report suspected disease clusters, and a protocol for investigating them. And to expand Health Canada's risk communication strategy to address consumer needs for more information around radiofrequency radiation. And to identify additional practical measures that Canadians can take to reduce their own exposure. These... these recommendations were really based upon, ah, ah, the, ah, you know, were in response to the public input that we received, ah, from the Panel... as part of the Panel. We also had some... a number of different research recommendations, ah, you know, in particular—if one has the chance to read the report, you'll notice that each section on a

particular health effect, basically, ends usually pointing out that more research is needed on those health effects, but—a few of the specific ones are: that Health Canada should aggressively pursue research aimed at clarifying the radiofrequency radiation cancer issue; that would allow government to develop protective measures if the risk were substantiated; and that Health Canada should pursue research to expand their current understanding of possible adverse health effects of exposure to radiofrequency radiation at levels below those allowed by *Safety Code 6*. The response to the Panel's Report, ah, from Health Canada...

C: Dr. Demers?

D: Yes?

C: Sorry to interrupt you. We are tight for time today, so if you...

D: I'm sorry.

C: ... if you have the ability just to wrap it up here in the next little bit, that'd be great.

D: I have about two sentences left. Thank you, very much.

C: Okay. Thank you.

D: The response to the Panel's Report that, ah, ah, from Health Canada, ah, that's publicly on the web is that they would review all the, ah, ah, the Panel's recommendations and would revise the levels in the update to *Safety Code 6*—which has now been adopted. I am personally not an expert in the measurement of electromagnetic fields—as I mentioned—but, ah, the, ah... Health Canada has reported that our feedback was incorporated. And in looking at the new *Safety Code 6*, you can actually see that changes were made, ah, in the recommended frequencies that we had recommended. Or that, ah, we had recommended they be lowered. With that I'll end up. And I'm sorry if I went over time.

C: That's great. Thank you, very much.

C: Okay. For first rounds of questioning, this round will be in... en français, so if you need the translation here, you can put it in your ear, set it to English. And we'll do a test-run before we start Miss Moore's time. Go ahead, Miss Moore.

Interpreter: So does everyone hear the interpreter? Can everyone hear the interpreter? (pause) Can *anyone* hear the interpreter? Is everyone hearing the interpreter? Can anyone hear the interpreter? So. And now can *everyone* hear the interpreter? Okay.

Miss Moore: [Live translation begins and continues for each speaker until transcriber notes "Translation ends."] In December 2010, the Committee published the... Health Committee published a review on potential health impacts on radiofrequencies and electromagnetic fields. The report was entitled, "An Examination of the Potential Health Impacts of Radiofrequency Electromagnetic Radiation." So. I... the... this is one of the recommendations that was in that report: that government of Canada consider providing funding to the Canadian Institutes of Health Research in support of long-term studies on this issue. And then that when it came to reviewing scientific literature, another recommendation had to do

with an exhaustive awareness program... a comprehensive risk-awareness program for exposure to radiofrequency electromagnetic radiation. Another one had to do with offering (??) to provide information, including awareness sessions on exposure to radiofrequency electromagnetic radiation. And another: 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. Following the federal election in 2011, these recommendations were never implemented. But of those five recommendations, I'd like to know—since they were tabled over four years by the Committee—which recommendations were followed up upon. And if not, why not? And if they were, or only partly followed, what percentage of implementation rate did you complete? And what are the next steps you plan to take?

A(??): Well, thank you for the question. I think it would be correct to say (pause) that Health Canada, of course, did receive the recommendations by the Committee in its 2010 report. I'd like to give you a quick overall of what it is we did following these... Committee's recommendations. They may take... this may take a bit time... a bit of time, since there are five recommendations. So could we begin with awareness programs?

W: Yes

A(??): Okay. On Health Canada's website, you will find information as to the effects of electromagnetic fields and how citizens can protect themselves if they wish to. There is information on cellular phones and how citizens may reduce their exposure. We have information on *Safety Code 6*, how *Safety Code 6* was developed. The measures that are being taken to protect Canadians' health. And there are a series of documents available on that website. I believe we provided the Committee with a list of the available documents posted on our website. There should be a copy of the list here, within my own documents. Perhaps I may ask you the question: did you receive such a list?

(inaudible)

A(??): And I think, we may have provided the Committee with a few copies of Health Canada documents amongst those available on our website.

W: Yes, we did receive those. Thank you.

A(??): And, as the Committee suggested, in 2010 Health Canada began to raise awareness among the population. And we do by providing information on our website. Do you have a more specific question?

W: With respect to awareness... raising awareness, if I've correctly understood, it's only people who go looking for the information on this subject—for example, by going onto your website—that they will become more aware. There's no program to go... to more aggressively raise awareness amongst the population. People have to go looking for the information themselves. So there is no awareness program in place to educate the whole population. For example, we're not sending messages to youth to warn them not to put... not to carry their cellphones in their pockets, for example, or not to place it directly against their skin.

A(??): No. There are no public service announcements on tv, such as the ones we've been seeing for drugs, for example. There is a program to raise awareness amongst youth and families, but they're not for the effects of electromagnetic fields, no.

W: I see. And when it comes to the complaints process, when it comes to negative effects, is there somewhere for people who believe that they've suffered from exposure to electromagnetic fields, or if healthcare professionals who believe their... they have a patient who may have reacted negatively to electromagnetic fields be able to report such... such effects?

A(??): Well, there is something in place: Consumer Product Safety Branch. And they have a system to receive complaints for any type of consumer products, which includes cellphones. So if someone thinks there's a problem with a cellphone or with electromagnetic fields associated with a cellphone, the system already... a system already exists to receive such complaints.

W: I see. When it comes to the industry, have you undertaken specific studies on the cumulative effect of several devices? For example, in a telephone[sic] you may have two or three cellphones, and the wifi router, the baby monitor, there can be... there can be any number of devices emitting such frequencies inside a house. [The French spoken in the Floor recording for the previous sentence was more like, "For example, in a house, you may have cordless phones, two or three cellphones, the baby monitor baby, the smart meter, and the wifi router, there can be... there can be any number of devices emitting such frequencies inside a house."] So have you studied cumulative effects? And also, have you done a specific study on pulses—for example, smart meters that transmit a wave of energy every 60 seconds that may last for up to several minutes or a few minutes? So that's a little more aggressive, rather than being just a constant background noise. This is really something that more closely resembles the water-drop torture. [Missing from the interpreter is another sentence or question something like, "Several questions about things specifically about pulsing waves."]

A(??): Well, when it comes to pulsing waves, I don't have specific information on that. I don't know if any of the colleagues accompanying have more information on that? (pause) Like you would see in smart meters?

W: What about the cumulative effects?

A(??): [Based on the Floor recording, several parts of the following paragraph seem to be somewhat incorrectly translated by the interpreter, as the interpreter's words were transcribed in the original of this unofficial transcript. The transcriber's notes embedded in this paragraph are cumbersome, therefore all that original transcript wording here and the, seeming, corrections to it are indicated by the strikethrough text, and what seems to be more correct transcript of this paragraph appears in it's entirety after that section of strikethrough text.] ~~Well, it is true that there are several sources of... of radiofrequencies in a house—as you said—wifi, cellphones, and many other pieces of equipment at times. I can tell you that the limits on... in *Safety Code 6* have to do with... cover all sources of radiation [interpreter said "RF"]. [Beginning at Floor recording timemark 43:14, there's a sentence missing in the transcript. It's something like, "It isn't only a single source."] So with... no matter what the source of RF, of radiofrequency, you have to respect the limits. [The previous sentence, seems to be incorrect by the interpreter and then partially repeated by the interpreter (not repeated by the speaker). Based on the Floor recording, I believe, instead of "So with... no matter what the source of RF, of radiofrequency," it begins with the phrase, "With all the sources together," and then continues as follows], you have to comply with the limits stipulated in *Safety Code 6*. But no, we don't know exactly how much... how much there is cumulatively within a house. [Based on the Floor recording, I believe the previous sentence (and the sentence following it in the original version of this unofficial transcript would be more correctly interpreted as the following sentence] But no, I'm not aware of studies... if anyone has done a study to see what are the levels of electromagnetic fields in a house with several sources, I'm not aware of such a~~

study. Well, it is true that there are several sources of... of radiofrequencies in a house—as you said—wifi, cellphones, and many other pieces of equipment at times. I can tell you that the limits on... in *Safety Code 6* have to do with... cover all sources of radiation. It isn't only a single source. With all the sources together, you have to comply with the limits stipulated in *Safety Code 6*. But no, I'm not aware of studies... if anyone has done a study to see what are the levels of electromagnetic fields in a house with several sources, I'm not aware of such a study.

[Translation ends.]

C: Okay. Thank you, very much. We are... we have to keep tight time here for questioning. Miss McLeod, go ahead.

Miss McLeod: Thank you, Mr. Chair. And thank the witnesses. I think I'm the only one that was here with the original report that we did. And I haven't been on Health Committee since. But, ah, so I'm glad to see that even though Parliament dissolved that there was some process that continued. And... and I would like to actually ask that we ensure that the review of *Safety Code 6* done by the Royal Society be tabled as part of our study, because I... I think it was a really critical piece of what we asked out of the last Committee. So if it has not been tabled already, we can perhaps incorporate it as part of this review. So, I think, ah, there's a few areas. Obviously, at this point in time, you talked about, you know, whether(??, 44:15) was a very robust process in terms of the research that you included and didn't include. And... and I keep going back perhaps to, I remember it was a couple years ago when, for example, Zamboni's procedure for... for MS was really, ah, provided hope for patients, and there was some research that indicated it might be helpful, but when we actually put in proper process in terms of evaluating the research, unfortunately, it sounds like to this day it's not something that, ah, is actually effective. Having said that, this research is going to continue to emerge and evolve. And... and so, I guess, the World Health Organization, are they doing a massive review right now? Is that accurate?

A: Perhaps I can ask Dr. McNamee to respond to that. Dr. McNamee has worked with the World Health Organization and is certainly up to date on the work that they're undertaking.

N: Yes. For the past several years—at least two years now—there has been an ongoing effort to assemble a risk assessment, on an international level through the WHO International EMF Project. And this process is... is basically a systematic review where all studies are identified, ah, they are assessed for quality, ah, according to a variety of different, ah, ah, measures that are required, ah. And ah, the studies are summarized. There's a statement of their strengths and weaknesses. Ah, ah, some studies which have very poor, ah, methodologies or quality, they are included in the analysis but, ah, they are removed from the final, ah, decision-matrix. But they are actually documented. So there's a very clear, transparent accountability over why or which studies have been looked at, which studies have been included for risk analysis, and which studies have been excluded based on quality. A draft version of that document was posted on the WHO website in, I believe it was, December of 2014. Ah. The public consultation, I think, was originally 30 days, but it was extended to 60. I believe that period has now ended. Ah. And the intent is to publish that risk analysis document by 2016.

Miss McLeod: So is it accurate to say that to date, ah, the evidence that you've reviewed and what seems to be emerging out of the review being done by the WHO, our standards under *Safety Code 6* are congruent with, ah, what the current research and literature indicates?

N: Yes. The... the reviews by international health agencies and NGOs have been quite consistent in their, ah, conclusions of an absence of adverse health effects below the exposure limits in standards such as ICNIRP—which is applied throughout Europe and in about 100 countries. Ah, in fact, *Safety Code 6* is now more restrictive than the... the ICNIRP standard in most frequency, ah, bands. Ah.

Miss McLeod: So as I go through the list.... And you know, it's interesting, because, of course, you know, we have some people that express concerns, ah, but I also will have people that are regularly asking for cellphone towers and... and coverage of all sorts. So I think there's this kind of real, ah, dilemma in terms of, you know, the population and what is really tools of living now. Ah, I see in Switzerland they have this really, really low rate. So first of all, maybe you could talk quickly about the dynamics of it. But second of all—and maybe it's Industry Canada—do they possibly achieve those limits, and if they do, then probably is Canada maybe really our exposure is down that low? Could people talk to that one, please?

N: Perhaps, I'll start. The Swiss limits... Switzerland and... and a couple of other cities or states.... City of Toronto, actually, also has a policy where they require, ah, emissions from cellphone towers to be, perhaps, 100 times below the national limits, such as *Safety Code 6* or... or ICNIRP, for that matter. So that while Switzerland's basis is on ICNIRP, for public exposures from celltowers or other infrastructure, they require it to be 100 times below that science-based limit. Now that's a public policy approach that have been taken by these governments. It has, ah... it's not necessarily applied to other wireless devices—such as wifi routers, smart meters, cellphones—so it's very targeted at a very specific type of technology, unpopular at times. So I think it's very important to make the distinction between this is a very specific, ah, action taken for a specific type of installation.

Miss McLeod: And Industry Canada?

H: So, hi. My name is Peter Hill. I'm with Industry Canada—the regulator of cellphone sites etc. And ah, I can tell you—based on our experience over decades—that the grand majority of cellphone towers are hundreds, or thousands of times, or tens-of-thousands of times below *Safety Code 6* limits already. In fact, the change to *Safety Code 6* had no impact on the power levels associated with those. The exposure that we do from a regulatory perspective is the cumulative effect. To the earlier question: it is all cumulative. So if there's five cellphone towers in a particular area, regulatory compliance is brought about by the cumulative effect. So. And we verify that on a regular basis around the country. So as I said, very, very, very few sites even get within 50 per cent of, ah, *Safety Code 6*. And the ones that are, ah, that get closer are high-power broadcast sites, which are generally located far away from where people is(??). And the issue is proximity and power levels at these kinds of locations. So at the end of the day, ah, many... most sites in Canada are thousands of times below *Safety Code 6* already.

C: (inaudible name), go ahead.

Miss Fry: Thank you very much. And I want to thank you for coming to sort of let us discuss and listen to something that is going to be more and more important. And as a politician, I can tell you that it is something I'm hearing from my constituents a lot. So the ability to shed some light, to look at some good public policy on this, is really, I think, important at this time. Now, I... I wanted to ask a couple of questions. I think, for instance, I... I noted that, ah, that the Panel didn't do a comparative and in-depth analysis of... of... of new literature. And I understand... I understand that the Panel felt that they weren't asked to do that. Now, *did* the Panel... my first question... do an... an extensive comparative review of *recent* literature?

D: Ah, yes. We did look at recent literature. Ah, the...

Miss Fry: Exten... really broad overview?

D: Yes, well it...

Miss Fry: (inaudible, ct)

D: ... within to look at each of the kind of targeted potential adverse health effects areas, we tried to look at, ah, papers that were published on those specific areas, ah, in the years since, ah, for instance, there was a good comprehensive review available. So for cancer—which is my area—we looked at, ah, the International Agency for Research on Cancer’s evaluation, and then we tried to identify papers that were published since that time, ah, and then look at the entire body of... of, ah, of research that was done. So that was... that was indeed what we did.

Miss Fry: Is there is *no* database that... that looks at clusters of... of new diseases, new cancers, etc. in people who have not only had, ah, extensive cellphone usage but... but also age-related, (a) frequency of use, and of course accumulative effect, and... and especially in children, how do you gauge the cumulative effect when it is only in the last three or four years that we have seen people exposing their kids to, ah, to cellphone use, etc., etc. as young as... as... as two or three? Now there is, obviously, no cumulative, ah, study done on the longitudinal effects of cumulative use etc., because these kids are still little. But do you not feel that it is important to have some kind of database that looks at clusters, that is reporting clusters, and that physicians maybe ask to see if they look at any kind of possible cause-and-effect on... on new cancers or people based on their cellphone frequency cumulative effect and age-related? Has that been done? Has Health Canada tried to set up such a database—a reporting system of some kind?

A: Ah, I would note first of all that when it comes to healthcare it’s a shared responsibility—as the... the Members know. Ah, actually healthcare delivery and treatment dealing with, ah, people who have cancer is... largely falls to the provinces. Certainly, the... the... both levels of government can legislate when it comes to health. But when it comes to, ah, what the provinces are doing as far as, ah, cancer epidemiology, ah, I... I can’t comment on that. From Health Canada’s perspective, ah, I’m not aware of databases Health Canada has, ah, established to look at cancers and, ah, perhaps clusters. But I think there was a question of jurisdiction there that would have to be, ah, considered as well.

Miss Fry: With due respect, I disagree with you. I think, when you look at drugs, and you look at setting up drug-reporting systems, Health Canada does that. This is a... a federal responsibility to collect information across the country on... on... on data that’s coming out of... of drug use, or adverse effects of the use of drugs, etc. And since the government of Canada is the one who okays and sets up, ah, the whole *Safety Code*, or the use of cellphones, etc., etc., setting up of celltowers, I would think it would be incumbent on... on the federal government to collect that kind of data. Because, as we well know, this is a very large country and very different provinces have very different usage and cell... numbers of celltowers etc. So I would think that this is a *real* role for the federal government. And I wondered why if one could do it in adverse effect of drugs, one couldn’t do it in adverse effect of the use of... of certain, ah, technologies. I... I just think that that’s a real question. The federal government is responsible for all Canadians. The provinces are only responsible for their provinces. And if we’re looking at safety and health—because we’re looking at the interaction between safety and health—that would seem to me to

be like falling off a log—a very... a very important thing to do, ah, that it would be common sense to want to do it.

A: Ah, I think what you're suggesting is, ah, would be fairly complex to implement. I... I understand the, ah, reporting of adverse events associated with drugs to the federal government. And I think that makes sense when the federal government is approving these drug products. Ah, when it comes to, ah, cancers, ah—I'm not a physician, so I... I can't comment from, ah, not strong knowledge-base here but—there are many types. Ah, how would they be associated with a particular cause? I think there's... there's a lot of, ah, details with what you're suggesting that I think would make it a very complicated, ah, proposal to try and implement. But it... it certainly, ah, it's certainly an interesting suggestion.

Miss Fry: Ah, I would... I would say that... that, in fact, it is no more complex than looking at the causative effect between smoking and cancers. Which, ah, has... has, ah, obviously, history taken by doctors about smoking and eventually finding out the relationship is something that, again, is what we do with epidemiology. And... and epidemiology should be looking at some of these relationships. I just think that it is important, ah, for us to be able to start ensuring that we... we keep... we keep a watching... watching brief on what is going on with new technologies etc. and... and monitor what... where the causative relationship is. We did it with... with cigarettes; we found it out with a lot of things that we did not know of before. And we now find cause-and-effect with lots of usage, or certain..., or lack of usage of certain foods, etc. This is a normal part of... of finding a way to collect good data based on clinical medicine, and outcomes, and disease. That's what epidemiology is: disease clusters, why are they there, how are they there, what are the causative effects? So I would hope that an epidemiological basis for looking at these new technologies—that are being used so frequently now—ah, that it's just really, really important for us to keep a tab on this. It's... I know that everyone thinks the Precautionary Principle is a joke. But it isn't. If we had observed the Precaution Principle a long time ago, we could have prevented a lot of the diseases that we now have that are very rampant. So I'm not saying that the Precaution Principle should stop progress, should stop the use of technology, should stop anything(?); but... but there needs to be some kind of data, some kind of watching brief, that is done by the... by the federal government on how the country, ah, various regions... and one may find a causative relationship between why things happen in Region A and don't happen in Region B, we have the same frequency duration, etc., etc. So I think this is an important part of new epidemiology. It's no longer that we're looking at... at, you know, cause-and-effect of... of the disease, of viruses, of bacteria; we now have to look at new kinds of... of things like technology and what its impact is.

C: Excuse me, Miss Fry?

Miss Fry: And did you not ask for that, Mr. Demers? I thought you guys asked for (inaudible, ct).

C: Excuse me, Miss Fry. We... I'm sorry, we're over time. Sorry.

Miss Fry: (inaudible)

A: Mr. Chair, may I just respond?

C: Very briefly, sir, yes.

A: Certainly. I would just like to... to mention that, ah, I think, we... we realize that the, ah, WHO/IARC have classed RF as a "Class 2B possible human carcinogen." Ah, I think, ah, Health... well,

Health Canada certainly is monitoring the scientific literature. Ah. Ah. We... we certainly are monitoring the, ah, the scientific literature when it comes to what's going on with, ah, cancer and RF fields and will continue to do so. Ah, and when there's... if there was some indication that that link is... is strong, ah. At the moment, the... the... that there is some indication that there is *something*. But ah, I think it needs a lot more research, as the Royal Society suggested. I would also like to mention that, ah, we are... we are already doing cancer surveillance in the Public Health Agency of Canada, ah, and the Canadian Partnership Against Cancer. So Health... the portfolio already is part of overall cancer surveillance.

C: Okay. Thank you. Thank you, sir.

A: Yes. Thank you.

C: Okay. Mr. Young, go ahead, sir.

Mr. Young: Thank you, Chair. And welcome, everyone. Ah. Mr. Adams, this chart was modified, revised from a British Columbia chart from the Center For Disease Control.

A: May I ask what chart you're referring to, please?

Mr. Young: It's a chart that's radiofrequency exposure limits in different countries.

A: Okay.

Mr. Young: Okay. Were China and Italy on this chart? And taken off?

A: I... I can't comment on that.

Mr. Young: I'll tell you why I ask. Because the two at the bottom are the lowest levels. They are Russia and Switzerland. China and Italy also have extremely low levels. Had they been included, it would have told a... a significantly different story. In fact, that's 1.2 billion people who are covered by very, very low levels—well below *Safety Code 6*. So I was a little disappointed in that. I want to ask you on the record why you expect the public... the Canadian public to just take your word for it that you looked at 140 studies presented by a national group based in my... my riding of Oakville? Why you just looked at them and just "trust us, we looked at them." Why can't you do the scientific method... practice the scientific method and conduct a... a report—put together a report that says, "we reject this study because it was the wrong frequency; we reject this one because it wasn't repeatable," or whatever? That's the scientific method(??). Why didn't you have enough respect for Canadians to show them why you reject the studies or why you accept them? What is your methodology?

A: Ah, I can... I can assure you—as I did during my opening remarks—that we did look at the 140 studies. Ah, most of those studies had already been looked at when the *Safety Code* was updated, but...

Mr. Young: No. No, I'm just asking specifically: why don't you just publish your thoughts? I mean, you looked at the studies. Somebody could put together a paragraph on each one and say, "we rejected it, that's for this one, for this reason, or we accepted it for that." So let me just leave you with that question, because I... I'm going to try to get three questions in. Please.

A: Okay. It was my understanding that we've already provided a summary, ah...

Mr. Young: I'm talking about a summary. I'm talking about a scientific monograph. Okay. I... I... I know you haven't done it. And I just leave you with that thought. In 2010, your Director General Beth Pieterse testified before this Committee, and here's what she stated. And it must be very important, because it was her primary evidence. She said, "There's no major jurisdiction in the world that has banned wifi from schools based on scientific evidence available." Well, since that time, France has banned wifi in daycare centres and nurseries, Taiwan has banned children from two... ah, under two from using, ah, radiofrequency devices—cellphones—Belgium has banned sales of mobile phones to children under seven and banned advertising to children, Israel has banned wifi in schools if there is an EHS-sufferer present and also they're testing levels of EMR in every school. So... by the way, the total population in these countries is 108 million, so that's pretty major. Doesn't that make... make you re-think everything you've said thus far? I mean, if it was that important back in 2010 that no other countries had done anything, now that they have, doesn't that make you want to re-think everything you've said thus far about *Safety Code 6*?

A: Ah, not at all. I think, ah, I have confidence in *Safety Code 6* and how we've developed it. I think it is a solid piece of work. And I think that's confirmed by the Royal Society's review. And I think that the fact that it is consistent with the WHO and other international reviews just supports that all the more.

Mr. Young: Thank you very much. Okay. I read your *Safety Code 6*. I've read all those documents, all the links you showed, and I read the latest one. I read about nerve stimulation, and excitable tissue, and dosimetry, and quotes that there's not... ah, "the evidence does not provide a credible foundation for making science-based recommendations." And frankly, it doesn't tell me what I need to know. And it doesn't tell me what my constituents need to know. "No evidence of harm" does not mean "safe." That's the industry line; that's what they always say, "Well, there's no evidence of harm." They just repeat it, ad nauseam. But it's not their job to keep Canadians safe. It's *your* job.

A: Oh, we're doing it.

Mr. Young: So here's... here's what I need to know. Please tell me. And this is a question posed to me by one of my constituents—that I repeat to you because I need the answer. "Please tell me in plain language, can you assure me that it's safe to put my cellular phone to my head for an hour a day? And I know... I want to know how many hours it's safe to do that for. Can you tell me it's safe to have a baby monitor a few feet away from my two-year-old granddaughter's head for eight hours a night? Can you tell me it's safe for my daughter to carry, in her bra, year after year? Will it harm her? Can you tell me is it safe for kindergarden... kindergarden children to have powerful wifi antenna five feet over their heads for eight hours a day? Or should we simply put jacks into schools and take wifi out of schools as other countries have done, as France has done?" I'd like to know if anybody who has spoken thus far in support of *Safety Code 6*, as it exists, wants to put their reputation on the line and tell me that all those uses are safe and those people will never come to harm (pause) from cellphone radiation or EMR?

A: I think what I'm confident saying is that if... if people use devices according to the manufacturers' instructions, and there are instructions about, ah, keeping, ah, the... the... like cellphones a certain distance from the body and things like that...

Mr. Young: 25 millimetres.

A: If people follow manufacturers' instructions and those devices respect the limits in *Safety Code 6*, I'm... I'm confident that they do not represent a risk... risk to Canadians.

Mr. Young: Okay. So despite everything... the study done in Sweden—the Lawson[sic] study—that showed a four-times increase in the chances of getting brain cancer on the side of a head you use your cellphone for a long-term continuous use, despite that you still think... do you think that would be safe? Or do you think they're all wrong—that their studies are useless and not worth paying attention to?

A: I cannot comment on that study, because I'm... I have not studied that. I'm... I'm not a scientist. I'm not familiar with that study. I cannot comment on it.

M: Maybe Mr. McNamee would like to comment.

N: Which study are you referring to, sir?

Mr. Young: I think it's called "the Lawson[sic] study"—a study out of... maybe I have the wrong one. It was a study done out of Sweden. And there... there have been more than one that show increased risk of brain cancer—glioma—and of the auditory nerve on the sign... the side of the head that people use cellphones, after long-term use.

N: Yes. So, the International Agency for Research on Cancer in 2010 and 2011, ah, did a study on this. I was actually a member of that panel. Ah, we looked at all of the data. There was... there were epidemiologists, there were medical doctors, ah, there were people with, ah, specialized in animal studies, in vitro studies, ah, looking at all the various lines of evidence to... to determine whether... what is the scientific basis for a potential cancer risk with... with RF fields.

Mr. Young: Thanks. I'd like to just try to get one more question in. I know... I know where you're heading with this, so I appreciate that. Thank you. We know that EMR can enter a human brain 4 to 5 centimetres; and of course, a child's head is only 10 centimetres when they're very, very young, so EMR is going right through their head. So if there's a baby monitor next to their bed, it's at the same frequency or close to the same frequency as a microwave oven, for maybe eight hours or... a night (inaudible). Have you ever done any studies that demonstrate that that's harmless to infants? Have you ever done any studies? Or do you know of any?

N: I think it's important to point out that you can never prove something is safe or something will never happen. We're... we're subject to the evidence base that we have at this time. The IARC committee looked at that evidence. And basically, ah, I mean, there were studies that found effects, there were studies that didn't find effects, there was a lot of animal and in vitro studies that were looked at. Ah, based on that, they made a recommendation that it be classified "2B possibly carcinogenic to humans." And that recommendation acknowledged that was some credible evidence suggesting there might be a risk in the long-term but it was impossible to make a causal association at this time.

C: Okay.

Mr. Young: So what standard of proof are you using?

C: Mr. Young, Mr. Young? Mr. Young, we're... you're... you're well over time.

Mr. Young: Thank you.

C: Miss Sellah, we have one... we have time for a brief question.

Miss Sellah: Okay. I have a brief question. [A few words in French language.] [Live translation begins.] First of all, I'd like to thank all the... all the guest panelists for being here to clarify this problematic issue, which, I imagine, will not ever be completely cleared up—given how quickly things change. What I'm intrigued by is this table that I see before me. And it is the limit to exposures for... to radiofrequencies for the general population of various countries. My question... and I know that, ah, Health Canada has made efforts between 2011(??, 68:04) and 2015. But if you look at Russia, for example, which is a... I'm talking about Russia as being a large country like ours, how could you explain that Russia's frequencies are at 900 megahertz and then have 0.10 as a threshold, whereas ours is at 2.7? I'd like you to explain that to me, please. Or more information on this data.

M: I think that it's difficult to explain the reasons for which other countries have set limits that are so low. But, as we already said, we do not believe there is any scientific justification for such low limits. And, as I already mentioned as well, in certain cases the limits are applicable only to celltowers and not across the board to all the infrastructure or all devices that emit radiofrequencies. So it's really quite difficult to provide reasons for other countries. However, we are confident that *Safety Code 6's* limits are adequate.

C: Okay. That's.... Thank you. Thank you. I have a point of order for Mr. Lizon.

Mr. Lizon: Ah, Mr. Chair, ah, you will release the Panel. Mr. Chair, what I would ask if Mr. Adams can provide for the Committee the information that Mr. Young was asking for: on what basis the 140 studies, or all the studies, were accepted or rejected. I think the Committee has the right to know what... on what basis that work was done and how it was done. And if they can provide it in a written form, it would... we(??) would(??) probably need it for the study.

C: Okay. Thank you. Ah, it's 4:40. We're going to suspend. We're going to come back. We're going to excuse these guests and bring some new ones in. And we'll start back up.

[70:09 recording goes silent]

[70:19 recording and transcript resume]

M: Thank you, Dr. Prato. (inaudible, ct)

M: [A few words in French language. No translation.]

M: We're done for the day, Mr. Prato. Thank you very much. The meeting is over. Thank you. (inaudible) Have a nice day. No, no, that's fine. Thank you, have a nice day. I'm going to shut off the feed now.

[70:47 recording goes silent, then music]

[73:52 recording and transcript resume]

S: [In progress] but I received my invitation just a week ago, so I guess the timing didn't work out to take advantage of your translation services. My name is Margaret Sears. I'm here as someone with some knowledge on the subject matter, but... very limited knowledge on the subject matter, but more importantly as a scientist interested in environmental health as well as methodology in this field. I'm inspired by working with Dr. David Moher's(??) research group here in Ottawa at the Ottawa Hospital. He's among the world's premier methodologists in clinical epidemiology, a highly respected and influential scientist. I also work in environmental health, was funded as a principal investigator for a Canadian Institutes for Health Research project. I'm associated with research institutes at both CHEO and the Ottawa Hospital, have worked with Canadian medical specialists in environmental health preparing reports for the Canadian Human Rights Commission, Canadian Transportation Authority, Alberta Energy Regulator, and others. I've been a guest editor for peer-reviewed medical journals and have co-authored several systematic reviews myself. So enough about me. Regarding *Safety Code 6*, I made submissions to the Royal Society of Canada and to Health Canada. And Dr. Moher(??) and I also attended a meeting on September the 19th with Mr. Adams, Dr. McNamee, and Miss(??) Bellier. I also recently responded to the World Health Organization during consultations on their review of health effects of radiofrequency radiation. I'll briefly answer a few of the... one of the questions about that. That consultation document is only partially done. There were no conclusions associated with it. And according to the methods section, their literature search ended in 2011. So it's far from complete, and so it's nothing that we could be basing anything on at this stage. And it also had no tables of evidence or anything like that in it. In short, I see major problems with reporting and... of which a reporting of these, ah, studies, which should reflect on the execution of these reviews. If a review is not well-conducted, it's subject to bias and incorrect conclusions. Last year, the prominent medical journal *The Lancet* published a series of articles on waste in research that was not adequately conducted or reported. It's a big problem. We're wasting a lot of money on bad... badly conducted and badly reported research. You've been provided with a paper by Rooney et al., describing the most recent methodology for systematic reviews in environmental health. The reviews of health and frequencies covered by *Safety Code 6* that I have examined, including many of the authoritative reviews relied upon by Health Canada, are lacking salient features of systematic reviews, as summarized in the chart that you have been provided. They've also captured but a fraction of the literature—at least to... according to what's in the... what's referenced—with organizations referring to the validity of one another's reviews. On the other hand, I have a sample of one of the systematic reviews that I co-authored. It's on a relatively narrow topic: dietary supplements and cardiovascular drugs. This is a concern for a much smaller segment of the population than, ah, radiofrequency radiation that we're all exposed to. But we started from scratch, because there was no good review to base it upon. And initially, we screened over 33,000 records. There's software and methods established to handle this kind of volume of literature. In a 2012 presentation, it was stated by Pascale Bellier that Health Canada has reviewed 50 years of research. Canadians are waiting to see this evidence, because it's not evident to date. Systematic reviews address specific questions, not really general questions so much. So you have to parse your questions in order to be able to tackle it with really good methodology. They're collaborative. They're transparent, which, certainly, umm, these processes with Health Canada have... have been, ah, leave a lot to be desired. And systematic reviews address biases ingrained(??, 78:38). You can only build upon previous reviews that are high-quality. Without previous high-quality reviews to build upon, we have to go back to that 50 years of data. What we have currently is a bit like that telephone game where messages get mixed up as they're half-heard as they're whispered to one another around the table. Now, I also believe that there's a good reason for concern in this field. *Safety Code 6* is said to protect against "established" health effects. What does it take to *establish* a health effect? Sometimes that hurdle is very, very high. And it's

a somewhat arbitrary bar, because people are.... Well, we'll... we'll talk about that in a... in a minute. But keep in mind, every time you hear "established health effects," what does it take to establish a health effect? I'll just give you a couple of examples of research in the, ah, in... in the slides that were distributed to you. There's a table with cancer studies. The clearest research originates from Hardell's group in Sweden, comparing phone use in people who had brain tumors with healthy individuals. This is called a "case control" study. In Sweden, the background rate of glioma is, I believe, lower than in Canada. We do not properly capture details of brain tumour incidence in Canada, although a database is being set up. Higher risks up to four-fold increases were seen in Sweden with use of wireless phones—both cellphones and cordless phones. The risk of a tumour on the side of the head where the phone was held increases when use begins earlier in life. So children and adolescents are at greater risk with longer cumulative time on the phone, with more years of use. But only part of this information was referenced by the Royal Society of Canada. The Interphone Study was referenced. Now, this was an enormous study over 13 countries. And the diversity of health status and co-exposures really muddied the waters in this study. For example, in some countries having a phone was a symbol of wealth and it was associated with a healthier diet and a cleaner environment. So initial analysis showed, oh, cellphones, they protect you from cancer, which even the author said was a completely implausible effect. And it was because of this confounding. So further analysis did show higher tumour incidence with phone use. And these two human studies were key in the IARC determination that cellphones, ah, possibly cause cancer. But since then, the French CERENAT study was published in 2014. It was not referenced in any of the documents from Health Canada or the Royal Society. And it's similar to the Hardell studies. When the analyses were performed in the same manner, these results were basically replicated. So now we have that replication. And that replication is key to becoming an established health effect. Now, ah, another concern of cancer is women who carry their phones in their bras. Phones are sending signals constantly to keep in touch with the network—even when you're not talking. So the first case was reported in 2009 in a keen cellphone user who stored her phone in her bra for 10 years. Now, these cases are piling up of characteristic tumours in young women with no known genetic predisposition. This information also was not taken into account. As far as know; maybe it was, but it was certainly not documented that it was taken into account. Now, if women carry phones in their bras, well, men carry a lot of phones in their pockets. In Canada, we do have some problem with infertility. And this is one of many studies showing effects on sperm, which is in your... there's the, ah, a graph in your... your handout there. When exposed to typical radiation from phones in pockets, sperm stop swimming, their DNA is damaged, and they die. So what we see in people is backed up by much other research in cells and animals. A lot of the recent research demonstrating potential harm was omitted from reports in the support of *Safety Code 6*, as was discussed previously. I should say that, ah, in the comments regarding the ability to assign a dose to an exposure, what happens in this research is if animals are merely exposed to a phone.... Now, a phone is hard to say, you know, this is precisely this number in... in exposure. But that is... you know, it's... it's status quo. But these status quo phone exposure studies are discarded. So there's a huge body of evidence that's discarded just because they used a phone instead of something that was, ah, more "scientific," in quotes. So in summary, I'd offer three recommendations. First of all, Health Canada must systematically access, assess, and act upon all the science from scratch. They need specific tools as well as methodological and library expertise to accomplish this. Secondly, we have to open our eyes and collect this environmental health data—both exposures.... Now, on that I note that this Industry Canada regular compliance data that they are accumulating, that should be made public so that if a doctor is concerned, he has that... that data to connect the dots. We also have to be collecting really good, detailed cancer incidence data. We used to collect that, but it's not available anymore. Public Health Agency of Canada has some data on their websites. We used to have it in small, ah, reported in small areas, but now it's only reported on the provincial level.

C: Dr. Sears, we're... we're over time. So if you could just summarize, please.

S: Okay. Ah. There is... this is a rapidly escalating, ah, ah, exposure, and I don't think we can really wait longer to take good actions, because the status quo is too much. So we should really move to, ah, minimize exposures while we carry out more research. Thank you very much.

C: Okay. Thank you. Thank you.

C: Professor Blank, go ahead.

B: I must apologize; I thought I would have the ability to refer to slides. But I'll just... you have the slides in front of you, and then I just will mention them as we go along. Thank you for the invitation. And you have my credentials on the first slide. I've been in the research business for a long time, in the Department of Physiology at Columbia University. And I've been active in connection with this Committee as well. Basically, the first slide says that *Safety Code 6* standards are not protective—with the “not” underlined. And what I'll try and do in the next few minutes is tell you why I think they're not protective. But in a nutshell, basically, they are not measuring the right parameters. If you want to measure something, you've got to measure something biological. Measuring the temperature is not a biological measurement; although you can measure the temperature of biological materials. You want biological parameters to be able to measure to assess biological function. The second slide, I comment on the 140 studies that were omitted. And the fact is that, ah, these were omitted by an evaluation by non-biologists. For example, there are two studies that were published by Dr. Goodman and myself that are really referred to very frequently. They discovered the fact that stress proteins are activated by electromagnetic fields. We studied mainly in the ELF range but we also studied in the RF range. And they were omitted in both(??, 87:03). And it has been verified and replicated by others. In the third slide, I mention the number of biological effects that could be, ah...

M: Excuse me, sir. Which slide did you refer to on the studies?

B: I'm on... I'm on third... the third slide now.

M: Oh, okay. Thank you.

B: This is a quote from a paper by two of the authors of the Report, Foster and Moulder, “The only unequivocal mechanism for bioeffects of radiofrequency is the heating of tissue.” This is... just makes no sense at all to a biologist. You can measure temperature, as I said, of anything, but it doesn't give you insight into biological function. Yes, a doctor will ask you, “Do you have a temperature?” to see if you've got an infection, for example; but that doesn't give you a clue as to how biological functional is going on. And there's a list on that same slide of a number of biological parameters that have been established as being affected by EMF exposure. And including, if you notice there, there's one there about enzyme acceleration. This is work that we did where some of the very basic enzymes involved in cell function—like the sodium,potassium-ATPase, which sets up the ion gradients that are responsible for nerve function, and cytochrome oxidase, which is the basic reaction that generates the ATP that drives all our cells—these are affected, and have been show to be affected, in the ELF range. But I haven't studied them in the... in the other range as well. So all these basic functions are evaluated, ah, are affected by, ah, the, ah, EMF. The fourth slide, I refer to the cellular stress response. This is a cell reaction to environmental dangers. This is if you ask a cell, “Are you in trouble?” if you measure these stress

proteins you're going to get the answer, "Yes" because the stress proteins are generated when there's trouble. Not the kind of trouble that we read about in the newspaper, but things like: heat shock, which means the temperature is going above the range and/or below the range as well, there's a heat part and there's also a cooling part, that you get a reaction of stress proteins generated by a cell; changes in osmotic pressure will generate a... stress proteins; and in acidity, changes in pH. These are the basic parameters that a cell will... will react to. And if you look at the next slide about the natural safety mechanism, this is the mechanism I refer to—that it protects the body by activating DNA in a particular region. Now, the thing about the DNA—and if you look in the sixth slide there, the next one with the picture shows what the DNA looks like. There's a chromosome that I have... diagram of a chromosome that I pulled apart. In other words, you tear it apart and you see what it's actually composed of. And everybody recognizes the end piece, which is the double-helix. The double-helix is the stuff that the, ah, became famous from the... the Watson and Crick story. But the fact is that that's the stuff that's in all our nuclei. And when I... when I went to school, I was told that's the stuff that parents pass onto to children. You know? So the rest of time you had the feeling it was sitting there doing nothing. It's active all the time; it's making stuff all the time. And it makes stress proteins when it comes in contact with some dangerous situation. And we've actually studied that reaction. And we found the particular groups that it reacts with. It reacts with a combination of four particular, ah, residues—these are bases—CTCT. That's a particular combination that we found was responsible for the response to heat shock, to a temperature stimulus. And the interesting thing about this is that this particular combination, just on a chance basis since there are only four of these bases involved in the DNA, if you look down the... if you look at that slide of the picture, the DNA is 2 metres long and it has 3 billion base pairs. In other words, this... this has many of these things sitting along there. And when you need a combination of... when you're talking about a particular combination of four particular ones—CTCT—you can get that every 250 base pairs, on average. Which means that there are many opportunities along that two... that three... ah, sorry, that 3 billion base pair array that's sitting there in the DNA. Many opportunities for interaction. And I have this picture that shows you the double-helix slowly being coiled into a coil, and then a coiled coil, and then a super-coil. In other words, there are many different sizes of coils in the nucleus that's sitting there in that chromosomal structure. I don't know how many of you will remember: way back when television first came in, the antennas that used to go up on the roof for reception of tv. Tv used to be transmitted in two particular wavelengths. And you had two different sizes of wires in there, or metal bars, that would pick up the different frequency ranges. In other words, the antenna functions by reacting to the wavelength of the radiation that's coming at it. And that is what's happening with the DNA. The fact that you have all these different, ah, sizes of loops, you can get the reaction to... like an antenna. Why does it react like an antenna? Because the DNA—in the same picture I have there—where you have these two twisted... or the double-helix, these two twisted coils with the bonds between them, they are lined by electrons. And the electrons can move; and they've been shown to move. There's a whole bunch of papers that come from Cal Tech. Barton(??) has done many studies on that. She's a world-famous scientist. And she has shown that you can get movement of electrons. And I think the reactions of the DNA with these environmental influence show that that does indeed happen with the different EMF frequencies. Because you have loops of different sizes, you can get reactions of the DNA with different frequencies of radiation. And that's why we ourselves have found interactions in the ELF range, and we have found interactions in the RF range. And others have published interactions all along. In other words, these arbitration... these arbitrary boundaries that are set by the, ah, engineers and the physicists who set up that table are just arbitrary. When you set up an "RF" at one point and cut it off at a particular.... And notice the cut-off is always at a point where the frequency has the number "3" in it. So it's either 3, ah, 300, ah, thousand, ah, waves per... per second, ah, and... or the 3 million megahertz. The fact is that the... the set up was arbitrary, totally arbitrary. Naturally it's a continuum. And so when you look at the DNA, you see that that's a continuum also. It's almost as if they're... you can react with

almost any part of it which happens to present itself at the surface. And I think this is, ah, reasoning from the observations. We have found, wherever we have looked at different frequencies and wherever it has been looked at by scientists, you can get reactions all along. I think that the, ah, division between ELF and RF is entirely arbitrary—as you can see by the divisions that are... by the arguments that are given by the Committee itself. The report that we are reading actually talks about the fact that they have to go into the ELF range, you know, or understand what's going in the ELF range in order to explain what occurs at the very, very low end of the RF part of the... their range. Because it's... that's the way DNA responds; it has antenna properties. In fact, one of the papers we published recently, ah, ah—it was also ignored—was that ELF... ah, DNA is a fractal antenna. That's a technical term which means that it has the capability of responding with frequencies in a very wide range. And this is something that you look up, and technology people are very wise to this kind of thing. It's a very useful thing to have: to have a multi-purpose antenna. In other words, you can pick up a lot of different frequencies. So, I would like to move on to the next slide, which is a reference to the research by Professor Alexander Lerchl. And...

C: We're at 10 minutes, now. So I give you some time to summarize, but if you have a lot more maybe the Members can flesh it out through their questions.

B: Okay. Well, I'll just mention that Lerchl—I refer to him because he has been one of those who has been a naysayer. Anytime everybody... anything has been presented, he says he doesn't believe there's any basis for a biological reaction. He just published a paper saying just the reverse. He says, "Our results show that electromagnetic fields obviously enhance the growth of tumors." And then, finally, the last slide that I have about recommendations is that I think that there are a lot of people being affected by this radiation *all* the time, and the least we can do is exercise greater precaution. And I particularly worry about the children, because children are sitting in schools six hours-a-day, five days-a-week, subject to this WiFi that's on continuously. And that, I think, is something that doesn't have to be. It may cost a little bit more to put cables in to supply the same information, the educational programs, but you certainly don't need WiFi to accomplish the educational results. And I think it's a sin to have this kind of exposure of children when we don't know if it's safe and many suspect it is not.

C: Okay. Thank you very much.

C: Mr. Rankin, go ahead, sir. And I'll just advise our Committee Members, I'll have to keep it tight to seven minutes so everybody gets a turn.

Mr. Rankin: Well, in fact, six minutes, please, because I would like to ask if you could interrupt me toward the end so my colleague Miss Moore could ask a very short question. I want to say thank you to the two witnesses who are here just now. I must say, listening to your testimony, ah, is very, very disturbing. And I'm putting myself in the position of a parent, sitting at home hearing what you've said—just after we've heard from Health Canada and Industry Canada assuring us that nothing is wrong. And I, as recently as they sent around to our Committee a *Fact Sheet* Health Canada has—it was modified less than two weeks, on March the... March the 13th—and it would seem to suggest that there's really nothing wrong, ah, with the, ah, *Safety Code 6* in protecting Canadians. And so I must say, it's very, very disturbing. Ah. I guess, the first question I would have, ah, for Dr., ah, ah, Sears, if I may, is that you recommend that Health Canada—if I'm understanding your... if I could summarize—that Health Canada must review the science "from scratch"—in your words—that they've got to make the data more publicly available, and that they have to collect detailed cancer data because what you used to be able to get is no longer available except at the provincial level. That's a very disturbing, ah, conclusion. And

the fact that the information is not being made publicly available is equally disturbing. Can you elaborate a little bit on that?

S: There's two issues. One issue is that a lot of data that should be being collected is simply not being collected. Ah, but the... an independent brain tumour group is starting up a database. It's not, ah, in place yet. In order to, ah... in order to detect sort of the oncoming tsunami of brain tumours—should that happen, and it looks as if, you know, it... we may see an increase in brain tumours—ah, we would have to have detailed information about where exactly these tumours are located. And ah, there's also an issue with tumours in the, ah, salivary gland, and we're not collecting that data at all. But you need to have detailed data on the location and the histology, the actual details of the....

Mr. Rankin: And... and why is it that that's not... what have you been told as to why such data is not being collected today?

S: It's....

Mr. Rankin: Is it because it's said to be provincial jurisdiction? Is it because it's too costly? Is it because the government has something to hide? I've no idea.

S: Ah, I don't know why they are not collecting that data.

Mr. Rankin: (inaudible, ct) but it clearly is important that it be done.

S: There's... it's something which should be captured from public health records.

Mr. Rankin: Yes. All right. Well, Dr.... Thank you, and you appreciate that time is so limited.

S: Yes

Mr. Rankin: Dr. Blank, you started by saying that, ah, ah, they weren't measuring... Health Canada were not measuring the right parameters, focusing on temperature but not looking at the biological parameters. I think you said something to that effect. Health Canada tells us, in this *Fact Sheet* I just mentioned, that, ah, they *do*. They say, "Health Canada scientists consider all peer-reviewed scientific studies, which includes thermal, non-thermal, and biological effects." So they claim that they're doing what you say they should be doing.

B: Well, I don't see. They didn't elaborate what the biological effects were and non-thermal effects were. They only one that they referred to was the, ah—I forget, the one—the particular ones that they had about non-thermal. But the fact is that they didn't refer to the stress response.

Mr. Rankin: Um-hmm.

B: Which I think is the body's first line of defence in connection with a lot of, ah, stimuli that are... that are present in nature.

Mr. Rankin: So... so if there is a... so, a stress protein created, as you suggested or some studies, ah, that you referred to—you and Dr. Goodman—ah, the implication seems to be that's a serious thing that... that stress proteins being... are created. Is that necessarily followed(??)?

B: Yes. That's the body... that's the body's reaction.

Mr. Rankin: Yes?

B: You'd never know that, because this was not written by biologists. And I'm amazed that at the beginning of the report they talk about the need... they... they put in a... a word for a, ah, chemical engineer...

Mr. Rankin: Hmm.

B: ... or another engineer to come onboard. They didn't even mention that they need a... they need one biologist. They need somebody there who understands what's going on at the level of the cell.

Mr. Rankin: So here we have your analysis, ah, very clearly presented—both of you. And you... you refer to, ah, toward the end of your recommendation, Dr. Lerchl from Bremen, who has in the past not been alive to these concerns, now recently concluding that there *is* a concern. And... and yet, as recently as March 13th, Health Canada goes and puts to the Canadian public a... a *Fact Sheet* saying that in fact there are no concerns, ah, here. Ah, this is very hard for Canadians to really understand. It seems to be our... our regulators are not giving this the attention that they... that this deserves. I say "seems" because I'm not a scientist; I have to rely on what they conclude and what you are... you two are asserting.

B: Well, we have been carrying this message out. Ah, I'm not a, you know, shrinking violet—as you can tell from my presentation—I call things the way I see them. And I've published a lot of papers. And I was President of the Bioelectromagnetic Society. And ah, I had organized symposia on the Precaution Principle. So I've been active in this, and I've made the message go out, and my papers have been published as well. The fact that they have been ignored, that's on the other side of the ledger. These guys don't want to hear it. Why? You may inquire into that as well, because that's an interesting question. But the fact is that they have ignored it. And when I... I actually pointed it out when I presented, ah, at an earlier review—at the time when the... before when the *Draft* of the report was being considered. I made a presentation then; said the same thing more and less. And it just was not mentioned. And the fact that they ignored the papers that... that Dr. Goodman and myself. We've published many papers on... on this subject. And it's a very important thing—if I may say so. I mean, it's a... this is a basic reaction of cells. And especially when you're(??) (inaudible, 103:04) in... in *harm* that's coming to cells, this is... this is, ah, this should be mentioned. It should at least get a footnote...

Mr. Rankin: (inaudible)

B: ... should get a reference in there that we looked at it.

C: Okay.

Mr. Rankin: Thank you.

C: Miss Moore, you're going to get a B.C. minute, and that's about 45 seconds.

Miss Moore: Okay. In your... in your opinion, should we establish specific limits for exposure to radiofrequency for pregnant women?

B: I think pregnant women deserve a, ah, a special category. Because the thing is that they may be classified with the rest of the adults, but the, ah, the growing fetus in utero, ah, although it's a small target nevertheless is a far more important target. And the fact is that *any danger* that occurs there is going to be magnified many-fold. And I think the pregnant women really need a separate category and a far more protective one.

C: Okay. Mr. Lunney, seven minutes, sir.

Mr. Lunney: Thank you very much. Well, you've got my attention very thoroughly. And thank you very much to our witnesses for being here with us. Ah, I want to start, ah, with Dr. Plank... ah, Blank, excuse me. Ah, you were talking about bioelectric, ah, medicine. That's, ah, if I... if I heard that right. You mentioned that and the effect on cells. And cells is something I'm very interested in. Are you familiar with "MENS therapy"—micro-current... micro-electric, ah, neuromuscular stimulation?

B: Ah, not under that title. But I....

Mr. Lunney: Well, it was... it was popular for athletic injuries and so on, starting in about the 90s—Carl Lewis, Ben Johnson—the sprinters of that era were using them for athletic injuries.

B: (inaudible)

Mr. Lunney: Anyway, I had some experience using that. But they're very, ah, low... low-frequency treatments. So you're talking about, ah, 50 to 100, ah, ah, micro-amps. It's... so it's low amperage, micro-amperage. But it's also low-frequency, like 0.4 to 0.7 hertz. So of course when you have very low-frequency you have very long wavelengths. Which seem to have a very profound physiological impact. Anyway, you have my attention with what you're suggesting here about cellular impacts. And I just want to read one short quote about MENS therapy, ah, just off the... the internet here, but, "1991—German scientist Dr. Irwin Naher," N-A-H-E-R, "and Bert Sakmann," S-A-K-M-A-N-N, "shared the Nobel Prize in Physiology in Medicine for their development of the patch clamp technique that allows the detection of minute electric currents in cell membranes. The method allowed the detection of 20 to 40 types of ion channels that allow positive or negatively charged ions in and out of the cells, and confirmed that electrical activity is not limited to nerve and muscle tissue." So now we're talking about what's going on in the cell. And I think that you've raised something extremely important in what's going on in the cell. And you'd be familiar, from your work, there's a lot of interest today in apoptosis. And for the, ah, interpreters, A-P-O-P-T-O-S-I-S, "apoptosis." Some people call it "apoptosis", the second "P" is silent. There's a lot of interest in that in cancer therapy. Ah, are you familiar with that term, sir?

B: Yes. Programmed cell death.

Mr. Lunney: Programmed cell death—exactly. And it may be that the... the body—with 80 to 100 trillion cells—that we have up to a million cells per second going through this process of cell destruction and recycling, programmed cell death and recycling—without damaging neighbouring cells, an amazing phenomenon. *But*, ah, of course there's a lot of interest in apoptosis *because*, ah, in cancer research now, we find tumour cells are full of an anti-apoptotic protein of several types. And viruses are able to introduce this kind of an anti-apoptotic protein. So it's key to understanding what's going on in the cells.

And, ah, any of your research indicate that in fact when cells are stressed and your stress proteins that you mentioned—the cell response to stress—that that stress response includes triggers that may in fact induce apoptosis in the cells, which can trigger, in fact, tumours under the right condition?

B: Ah, the answer is that I don't know of anything. But there are about 20 different, ah, stress proteins that have been identified. And not all of them have been, ah, you know, tagged as to what their specific function is. It... it wouldn't surprise me if there were something like that. Although, ah, cells are, ah... and their enemies are very clever. And they're constantly fighting with each other. So you... you invent a cure, and Mother Nature thinks of some way in which the cure can be circumvented. So it... there are all kinds of possibilities (inaudible, ct).

Mr. Lunney: Well, cells are worlds within worlds of activity.

B: Definitely.

Mr. Lunney: Ah, so you had my attention when you mentioned DNA. They're the most efficient, ah, information storage system that we've identified anywhere in the Universe, so far, with the data that's compacted in that... that DNA structure. I wanted to ask you to go back to what you said about, ah—because maybe I missed something—the CTCT sequence, about every 250 base pairs. And what was the implication? Were you implying that ELF frequencies can interact with the genome at some level and... and have negative impact? Could you please expand on that?

B: On a sort of a pure chance basis, given 4 of the bases that, ah, are used by the body to make DNA, to code... to make the code, to use the code, you would expect in 3 billion base pairs that you would find one in every, roughly, 250 lengths. And, ah, that means that there's a possibility of interacting at any point in the DNA chain. And since any point may come at a particularly sized loop—in other words—you may get a CTCT at the very end with a little piece of chain sticking out, you can get a reaction there but you can also get one where you've got a loop and a coiled coil, which represents a larger, ah, more like the big ring on the old tv antenna. And the... the DNA has electrons that can respond and *do* respond to electric fields.

Mr. Lunney: Okay. Was there a particular reason that it was the... the CTCG[sic], well, that... that particular...?

B: Yes. That's the one we identified. We actually (inaudible, ct).

Mr. Lunney: That... that is biosensitive.

B: That's the one we found reacting, ah, in the... in the reaction that started the formation of stress protein HSP70.

Mr. Lunney: Okay. Well, thank you for that, fascinating. Ah. Meg... Meg Sears, you mentioned... of course, you got all the men's attention when you mentioned, ah, sperm. I know there was a study on, ah, on vasectomies on tv. At least the men in the audience, as soon as they brought it up all the men were simultaneously caught crossing their legs.

(some laughter)

Mr. Lunney: Anyway, I'd just say that, ah, you mentioned brain tumours especially in children, you mentioned, ah, salivary glands, the bra... the brassiere, ah, for 10 years. I mean, that would seem to me that you would have tremendous potential for disruption of cells when you have that device so close to your body. I'm trying to keep mine away from my body as much as possible (inaudible, laughs a little).

S: Good plan.

Mr. Lunney: But I can tell you, in my own experience, when I started to carry a cellphone on my, ah, waist, I had a lot of thought about where I was going to put it. I sure didn't want to put it anywhere near my heart.

S: Um-hmm.

Mr. Lunney: So I finally strapped it on down here next to the iliac crest, hoping it might... you know, the kidneys might be exposed but hopefully a little more shielding there. But I can tell you, I felt a pain in my own hip when I started to carry that thing 15 years ago after I was elected—because I never carried one before. And eventually that was, ah, shut down. I think it would be a habituation. And ah, anyway, but after 10 years, I know that pain started to come back. So I've switched to the opposite side. And I notice when I talk on a cellphone for more than a few minutes, I would get a pain in the temple. And that caused me some concern. That's just anecdotal, of course. But I think that the information you're presenting, ah, here, that is a bit alarming since, ah, you mentioned that the literature search ended in 2011. And I think both of you...

S: Yes.

Mr. Lunney: ... have alluded to research that has come up *since*. And can I just ask you to please identify... this is back to Dr. Blank.

C: Mr. Lunney? Mr. Lunney?

Mr. Lunney: Could I just ask him to identify when this research was done that he mentioned from Mr. Lerchl—L-E-R-C-H-L?

C: Very brief, very brief.

B: That's not published yet. It's out. But you can actually find out about it by looking at the, ah, *Microwave News*. They actually... when this came out, they did a special article on it. Louis Slesin, who is the editor of that, has a very good, ah... he has been publishing for years—very good information source about EMF.

Mr. Lunney: Okay. Thank you.

B: Look up "Microwave News."

Mr. Young: Point of order.

B: By the way, if I can just say one thing that you may be... you may be grateful for. People don't realize that the cellphone in order to operate has to know where you are all the time. And so it is

constantly in contact with a tower, which means that it is sending signals out. You don't realize that when you're... when you're carrying it. It's easy enough to shut it off, and then when you want to know what messages have come turn it on and listen to it. Don't keep it on all the time, because you're getting irradiated.

C: Okay. Did you have a point of order, Mr. Young?

Mr. Young: Just that, ah, Chair, I wonder if we can ask the Clerk to perhaps find that article and send it out to the Committee Members.

C: I think you'll stay late tonight to get that done.

(inaudible, some laughter)

M: (inaudible, ct) it's not published yet.

(inaudible, ct)

F: It's not published yet.

(inaudible, ct)

M: They will.

S: University website, as well.

C: Yes. No, they... when it's... when it's published, we'll make sure that, ah...

M: Meg Sears just said it might be available on the University website.

C: Okay.

M: Thanks.

C: Well, our analysts will dig it up if it's out there. Miss Fry?

Miss Fry: Thank you. I... I must say that... that I found, ah, I found Dr. Blank... Dr. Sears gave us protocols of how we should be looking at good research etc. and how we should be evaluating it. And I noticed that those are not the protocols used for evaluating research by the... by Health Canada when they... when they got their report. They used a totally different set of protocols. I think, Dr. Blank, you are very intriguing, because I think everything you said—for me, anyway—makes a lot of sense. Ah, the body is an... is an electric organism in many ways. The cells respond...

B: *The Body Electric* was the title of (inaudible, ct). Yes.

Miss Fry: Exactly. It responds to... to positive ions, negative ions, cause whole cellular structures to work. Ah, we look at... we look at how in people use when their... when muscles are in pain they use... they use electricity to stimulate the muscle. We... we know that the heart... if you have a heart... if you suddenly

have a, ah, your heart stopped, the first thing you do is you put paddles on and you stimulate the heart. The brain works on the same kind of electro... electric stimuli. So it's not at all a leap of faith to know that electromagnetic activity will impact on the human body in many ways. I found that your, ah, your... this... the idea that you pointed out that there were no biologists makes me really, ah, (pause) think. Because I think one of the things we forget when we talk about research, or we talk about any kind of research, we forget *basic*... the very basic research. We always talk about applied research, and... and, ah, and commercially-based research, and research that will have impact clinically, etc., etc. But we... we forget about basic research. And basic research is at the heart of any kind of research. So biologists are going to be extremely important, especially when you told me about DNA. We know that... that there are lots of things that... that actually create very different chromosomal activity. Ah, we know age is one. When we look at Down Syndrome in the old days. We... we look at so many other factors that influence it. So it just... what you're saying makes a lot of sense to me. What I wanted to ask you was this. Ah. And... and Dr. Megs, because you mentioned it too. The... the... just as basic research is core to good scientific research down the road, I actually wonder why data collection is not seen as being essential to any kind of epidemiology, any kind of... of whether it's basic demographic epidemiology, whether it is looking at clinical epidemiology, it is inherent. And... and I was told that data, they're not... that this... the government is not collecting a great deal of data to look at cause-and-effect. I mean, I... I think of... of the times when we... we used things out of lack of knowledge, and lack of data collection, and lack of... of looking before we leapt, and thalidomide comes to mind. Alcohol's effect on the fetus comes to mind. Nobody ever felt that any of those things could have a problem. Ah, you know, we're looking at environmental exposure now on people with asthma etc. causing huge problems. *If* you're going to be mutating—not only from environmental stressors—but if this... this stress protein, that you talked about, is triggered based by... by... by very much by exposure to... to environmental changes and to... and to radiation etc., ah, shouldn't we be collecting good data? That's my question. Shouldn't we be collecting data? In other words, it's so simple to ask, ah, to... to look at... at the number of the gliomas, to look at... at... at all kinds of... of brain cancers, breast cancers, etc. and see that they are actually forming, ah, clusters, that there are clusters in certain areas. We could... we could figure that out. I mean, we figured out a lot of things eventually, long after they happened. Ah, I just think that the time has come now, with all of the knowledge and the information we have, that we could be collecting good data and looking at epidemiology from a different way, and looking at how we prevent. And you're absolutely right about the fetus. Pregnant women should be in a different category. And so we need to be able to look at protecting people. It's too late (pause) 15 years after a child has been exposed to... to cellphone activity, to WiFi, etc., etc. at the very young age for us to say, "Oh... oh. (inaudible), we didn't know that. We should have done something about it," and now start really doing something about it. I would think we have enough history to tell us about cause-and-effect over the years and... and about the way that... that the cells... cells work and how they... they respond to various things. So why is it that we heard from Health Canada, (a) data collection, clinical epidemiology is a provincial jurisdiction? That's... that's extremely interesting—given that we're looking at epidemiology *now* from an... as an... as an *international* issue, we're thinking it has to be provincial in this country? Why can it not be federal? Why can't we be able to get that information and look at whether there are other factors—not simply and only electromagnetic fields, but whether in certain parts of Canada electromagnetic fields are enhanced *by* certain other things that occur in those parts of Canada? Who knows what they are.

S: Yes.

Miss Fry: But I just think that it's... I just want to hear you talk about data. I... I want us to get this idea that we must be collecting good data to give us evidence to link them—clinically—to link them, ah, with... with... with new diseases, to look at frequency, and all of those things. Can you talk to me about

data? I... I just want some more... more information, because I really feel that this is at the heart of what we're *not* doing in this country.

S: We used to do a better job of it. Ah, I have taught a little bit of epidemiology. And one of my favourite things to do, at one point, was to tell people to go to NRCAN's Atlas, to go to the Public Health Agency of Canada's website, and to.... And there's a few other sites, ah, the... they used to have a really good, ah, website for toxic sites in Canada through Revenue... ah, through, ah, through the government of Canada. And all of those have been severely degraded. The Atlas is gone. And ah, that data collection for cancers, usually it's done by Canadian Cancer Society and StatsCan, but it's very, very crude data that they're...

Miss Fry: Yes.

S: ... that they're bringing together. For instance, you can find data since 1992 on, ah, brain tumours and 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. So even though we are now starting up some kind of brain tumour registry, we won't have that data from 1990 to detect a *change* until, you know, we've had time for a change to happen. So we'll be kind of midstream. But why that is happening, I don't know. It... we need a lot more evidence. And one other concern with radiofrequencies is that they affect membranes, and so environmental contaminants like lead or other things that go through membranes and... and have their toxic effects, ah, these other toxic effects may be magnified in the presence of the radiofrequencies that are compromising the integrity of the cell membrane. So that's a concern that has been brought forward repeatedly. And it's open research questions. There's some preliminary evidence in children that that actually is happening with lead. But ah, we... you know, once again, it's not well established; that's one study. But we certainly do need to be collecting environmental data, the, ah, the data in schools. And we need to have much, much better public health data—not only for cancers but for other conditions as well. And that quality has gone way downhill in the last five years.

Miss Fry: Thank you.

B: (inaudible, ct) can I make a comment on this (inaudible, ct)?

C: Yes, sir. Sure.

B: If you collect data, very often it's just an... an assembly of numbers. If you have a hypothesis then you can generate something from the numbers. And there was a case of Sam Milham—who is an epidemiologist from the State of Washington—and he had the idea that the, ah, there was a... a link between the incidence of leukaemia in children and the, ah, the electrification, because electrification didn't occur in the United States at the same time. The north and east had it long before the south and west. And so he went to different places and started collecting data on the incidence of leukaemia. And lo' and behold, he found that when electricity was introduced, within a few years there was a jump in, ah, leukaemia. And the thing is that... and... and it correlated with the introduction of electricity. So if you look at his data, you see that there's a bump in there. And that was the origin of the linking of EMF... low... ELF, ah, with... with leukaemia. So he knew what he was looking for, and luckily the incidence of leukaemia had somehow been... had been collected. Now, you... you've got to find something that will have the kinds of numbers you want, otherwise you'll just have file cabinets full of numbers.

C: Okay. Well, thank you very much. We're... we ran into overtime this afternoon. So good meeting. Meeting adjourned.

(music)

[123:01 end of recording]

[end of transcript]

The screenshot shows a web browser window with the URL `parlvu.parl.gc.ca/parlvu/ContentEntityDetailView.aspx?contententityid=12739&date=20150324&lang=en`. The page is titled "Parlvu Event Center" and features the Parliament of Canada logo. The main content area displays details for "HESA Meeting No. 54", including the location (The Valour Building - 228), event date (Tuesday, Mar 24, 2015, 3:31 PM - 5:33 PM), actual start and end times, and duration (2 Hours 1 Minute). The status is "Adjourned" and the description is "Meeting No. 54 HESA - Standing Committee on Health". There are also links for "Information" and "Support". A calendar on the left shows the date March 24, 2015, highlighted. The page footer includes a "Home" link and "Important Notices".