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Dr. Paul Demers
Chair of the Royal Society of Canada's Expert Panel Reviewing
Safety Code 6
c/o Russel MacDonald at admin-assistant@rsc-src.ca

Dear Dr. Demers,

My understanding is that the Royal Society of Canada has convened an Expert Panel to review Safety Code 6. I am writing this letter at the request of some concerned Canadians. Please accept the following as a submission to the Expert Panel.

My Background and Research Focus

My group investigates health effects of modern, man-made electromagnetic fields as well as the functional impairment electrohypersensitivity. I introduced the clinical term "screen dermatitis" to explain the cutaneous damages that developed in the late 1970's when office workers, first mostly women, began to be placed in front of computer monitors. I called for action along lines of occupational medicine, biophysics and biochemistry, as well as neuroscience and experimental dermatology. The working hypothesis early became that persons with the impairment electrohypersensitivity react in a cellularly correct way to the electromagnetic radiation, maybe in concert with chemical emissions such as plastic components, flame retardants, *etc.*, in a highly specific way and with a completely correct avoidance reaction -- just as you would do if you had been exposed to *e.g.* sun rays, X-rays, radioactivity or chemical odours.

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I and my collaborators have, in addition, worked in great depth in areas such as skin diseases, cancer, child delivery, female urine incontinence, oral mucosa diseases, brain and spinal cord morphology, synaptology and chemical transmission, peripheral nervous system-related issues, cardiac function, skeletal muscle function and disease, and connective tissue ripening phenomena.

My comments to the Expert Panel Reviewing Safety Code 6 will include:

- 1. Electrohypersensitivity (EHS) in Sweden and elsewhere**
- 2. Non-thermal effects of electromagnetic fields on human health**
- 3. Involuntary exposure and children**
- 4. Concluding remarks**

1. Electrohypersensitivity (EHS) is Sweden and elsewhere

In Sweden, electrohypersensitivity (EHS) is an officially fully recognized functional impairment (*i.e.* it is not regarded as a disease, thus no diagnosis* exists. This is not unique to Sweden, the terms "functional impairment" and "disease" are defined according to various international documents (see below)). Among the nine million Swedes there are currently around 250,000 people with this disability.

[*Its symptoms are classified as an occupationally-related symptom-based diagnosis (code ICD-10) by the Nordic Council of Ministers since 2000. DIVS: 2000:839; ISBN: 92-893-0559-2

http://www.nordclass.uu.se/verksam/yrke_s.htm]



Persons with the functional impairment electrohypersensitivity have their own handicap organization, The Swedish Association for the Electrohypersensitive (<http://www.feb.se>; the website has an English version). This organization is included in The Swedish Disability Federation (Handikappförbundens SamarbetsOrgan; HSO; <http://www.hso.se>; the site has an English short version). As a consequence of this, The Swedish Association for the Electrohypersensitive receives an annual governmental subsidy.

Fortunately, for most persons with electrohypersensitivity their impairment is not life-debilitating, thus, with accessibility alteration measures of their home, their workplace, their means of transportation, and their places of leisure, they can manage their life well. However, for a smaller proportion of persons the symptoms - including also light intolerance - are very severe, and for yet another group they can be completely devastating, leaving them no other choice than to leave our modern society and spend a lengthy time in desolated parts of their country, living in small shielded cabins, huts, tents or trailers. Such refugees can be found in many countries, including Finland, Sweden, Norway, Denmark, Switzerland, France, Germany, the UK, and the USA and in Canada.

The first step for a person in Sweden with a functional impairment is to contact the municipality's special civil servant for disability issues, as well as the various handicap organizations and authorities, to achieve accessibility measures of various types with the sole aim to have an equal life in a society based on equality (according to the The UN 22 Standard Rules on the Equalization of Opportunities for People with Disabilities - since 2007 upgraded into The UN Convention on Human Rights for Persons with Functional Impairments, <http://www.un.org>).

An impairment is - by definition - not defined by someone else or



proven by certain tests, *etc.* The impairment is always personal (private) and develops when in contact with an inferior environment.*

[*Note: Functional impairments are only based upon each individual's impaired accessibility to - and contact with - an inferior environment (cf. the UN), thus, there is actually no need for any "recognition" in local laws (cf. the UN). In Sweden, the former Minister of Health and Social Affairs, Lars Engqvist - as a member of the previous government - anyhow gave his "approval" in a letter dated May, 2000 [Regeringskansliet 2000-04-06, Dnr S2000/2158/ST]. He also made it clear in his response that for EHS persons there are no restrictions or exceptions in the handicap laws and regulations. Thus, these laws and regulations are to be fully applied also for EHS persons. In addition, national and international handicap laws and regulations, including the UN 22 Standard Rules/UN Convention and the Swedish Action Plan for Persons with Impairments (prop. 1999/2000:79 "Den nationella handlingplanen för handikappolitiken – Från patient till medborgare"; Proposition 1999/2000:79, 1999/2000:SoU14, as well as the Human Rights Act in the EU fully applies.]

In a recent, paper by Hagström *et al.* titled "Electromagnetic hypersensitive Finns: Symptoms, perceived sources and treatments, a questionnaire study", *Pathophysiology* 2013, 20:117-22, it is concluded that "*the official treatment options, psychotherapy and medication, did not have any significant effect. Instead, according to 76% of 157 respondents the reduction or avoidance of electromagnetic fields helped in their full or partial recovery. The best treatments for EHS were given as: "dietary change" (69.4%), "nutritional supplements" (67.8%) and "increased physical*



exercise” (61.6%)”.

Their results agree well with previous studies, such as:

Holmboe G, Johansson O, "Symptombeskrivning samt förekomst av IgE och positiv Phadiatop Combi hos personer med funktionsnedsättningen elöverkänslighet", (= "Description of symptoms as well as occurrence of IgE and positive Phadiatop Combi in persons with the physical impairment electrohypersensitivity", in Swedish), *Medicinsk Access* 2005; 1 (5): 58-63

Kato Y, Johansson O, "Reported functional impairments of electrohypersensitive Japanese: A questionnaire survey", *Pathophysiology* 2012a; 19: 95-100

Kato Y, Johansson O, "The situation of electrohypersensitivity: Symptoms, EMF sources, economic and social problems, and precautionary approach", *Jap J Clin Ecol* 2012b; 21: 123-130

Hagström M, Auranen J, Johansson O, Ekman R, "Reducing electromagnetic irradiation and fields alleviates experienced health hazards of VDU work", *Pathophysiology* 2012; 19: 81-87

EHS persons' right to get disablement allowances has been settled in the The Swedish Supreme Administrative Court, *i.a.* in the judgement □”dom 2003-01-29, mål nr. 6684-2001” .

2. Non-thermal effects of electromagnetic fields on human health

Wireless communication is now being implemented in our daily life in a very fast way. At the same time, it is becoming more and more obvious that the exposure to electromagnetic fields not only may



induce acute thermal effects to living organisms, but also non-thermal effects, the latter often after longer exposures. This has been demonstrated in a very large number of studies and includes cellular DNA-damage, disruptions and alterations of cellular functions like increases in intracellular stimulatory pathways and calcium handling, disruption of tissue structures like the blood-brain barrier, impact on vessel and immune functions, and loss of fertility. Whereas scientists can observe and reproduce these effects in controlled laboratory experiments, epidemiological and ecological data derived from long-term exposures in well-designed case-control studies reflect this link all the way from molecular and cellular effects to the living organism up to the induction and proliferation of diseases observed in humans. Although epidemiological investigations as such never demonstrate causative effects, due to the vast number of confounders, they confirm the relevance of the controlled observations in the laboratories.

Precautionary principle

Because the effects are reproducibly observed and links to pathology can not be excluded, the precautionary principle should be in force in the implementation of this new technology within society. This will inevitably be the only method to support the sustainability of these innovative wireless communication technologies.

The February 2, 2000 European Commission Communication on the Precautionary Principle notes: "The precautionary principle applies where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU". Therefore, policy makers immediately should strictly control exposure by defining biologically-based maximal exposure



guidelines also taking into account long-term, non-thermal effects, and including especially vulnerable groups, such as the elderly, the ill, the genetically and/or immunologically challenged, children and fetuses, and persons with the functional impairment, electrohypersensitivity.

[For more details please see: Dämvik M and Johansson O. "Health risk assessment of electromagnetic fields: a conflict between the Precautionary Principle and environmental medicine methodology. Reviews on Environmental Health" 2010; 25(4):325-333.]

Seletun Scientific Statement, 2010

In November, 2009, I was involved in a Scientific Panel comprised of international experts on the biological effects of electromagnetic fields, which met in Seletun, Norway, for three days of intensive discussion on existing scientific evidence and public health implications of the unprecedented global exposures to artificial electromagnetic fields (EMF) from telecommunications and electric power technologies. This meeting was a direct consequence of ongoing discussions already from the mid-nineties, when cellular communications infrastructure began to rapidly proliferate, and stretching through, among many, the Benevento (2006), Venice (2008) and London (2009) Resolutions from this decade. It further involved important conclusions drawn from the 600-page BioInitiative 2007 Report published August 31, 2007, which was a review of over 2,000 studies showing biological effects from electromagnetic radiation at non-thermal levels of exposure, which partly was published subsequently in the journal Pathophysiology (Volume 16, 2009). This report has subsequently been updated: the BioInitiative 2012 report contains even stronger evidence supporting these resolutions.

The Seletun Scientific Statement (2010) recommends that lower limits be established for electromagnetic fields and wireless



exposures, based on scientific studies reporting health impacts at much lower exposure levels. Many researchers now believe the existing safety limits are inadequate to protect public health because they do not consider prolonged exposure to lower emission levels that are now widespread.

The body of evidence on electromagnetic fields requires a new approach to protection of public health; the growth and development of the fetus, and of children; and argues for strong preventative actions. These conclusions are built upon prior scientific and public health reports documenting the following:

- 1) Low-intensity (non-thermal) biological effects and adverse health effects are demonstrated at levels significantly below existing exposure standards.
- 2) ICNIRP/WHO and IEEE/FCC public safety limits are inadequate and obsolete with respect to prolonged, low-intensity exposures.
- 3) New, biologically-based public exposure standards are urgently needed to protect public health world-wide.
- 4) It is not in the public interest to wait.

Accordingly, EMR exposures should be reduced now rather than waiting for proof of harm before acting. This is in keeping with traditional public health principles, and is justified now given abundant evidence that biological effects and adverse health effects are occurring at exposure levels hundreds to thousands of times below existing public safety standards around the world.

- The Seletun Panel (2011) recommends wired internet access in schools, and strongly recommends that schools do not install wireless internet connections that create pervasive and prolonged EMF exposures for children.



- The Seletun Panel (2010) recommends preservation of existing land-line connections and public telephone networks.
- The Seletun Panel recommends against the use of cordless phones (DECT phones) and other wireless devices, toys and baby monitors, wireless internet, wireless security systems, and wireless power transmitters in SmartGrid-type connections that may produce unnecessary and potentially harmful EMF exposures.
- The Seletun Panel recognizes that wired internet access (cable modem, wired Ethernet connections, *etc.*) is available as a substitute.

"No proof of health effects"

One often hears about "safe levels" of exposure and that there is "no proof of health effects", but my personal response to these seemingly reassuring statements is that it is very important to realize, from a consumer's point of view, that "no accepted proof for health effects" is not the same as "no risk". Too many times, 'experts' have claimed to be experts in fields where actually the only expert comment should have been: "I/we just do not know". Such fields were *e.g.* the DDT, X-ray, radioactivity, smoking, asbestos, BSE, heavy metal exposure, depleted uranium, *etc.*, where the "no risk"-flag was raised before true knowledge came around. Later on, the same flag had to be quickly lowered, many times after enormous economic costs and suffering of many human beings.

In the case of "protection from exposure to electromagnetic fields", it is thus of paramount importance to act from a prudent avoidance/precautionary principle point of view. Anything else would be highly hazardous. **Total transparency of information** is the key sentence here, as I believe the public does not appreciate having the complete truth revealed years after a certain catastrophe



already has taken place. For instance, it shall be noted, that today's recommended values for wireless systems, such as the SAR-values, are just recommendations, and not safety levels. Since scientists observe biological effects at as low as 20 microWatts/kg, can it truly be stated that it is safe to allow irradiation of humans at SAR 2 W/kg, or at 100,000 times stronger levels of radiation?

Imbalanced reporting

Another misunderstanding is the use of scientific publications (as the tobacco industry did for many years) as 'weights' to balance each other. But **one can NEVER balance a report showing a negative health effect with one showing no effect**. This is a misunderstanding which, unfortunately, is very often used both by the industrial representatives as well as official authorities to the detriment of the general public. True balance would be reports showing negative health effects against exact replications showing positive or no effects. However, this is not what the public has been led to believe.

Need for independent research

In many commentaries, debate articles and public lectures - for the last 20-30 years – I have urged that **completely independent research** projects must be inaugurated immediately to ensure our public health. These projects must be entirely independent of all types of commercial interests; public health can not have a price-tag! It is also of paramount importance that scientists involved in such projects must be free of any carrier considerations and that the funding needed is covered to 100%, not 99% or less. This is the clear responsibility of the democratically elected body of every country.

WHO/International agency for Research on Cancer (IARC, 2011

Recently (in Lyon, France, May 31, 2011) the WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic



to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer.

It should be noted that this is an addition to the previous (2001) 2B classification of power-frequent (ELF) electromagnetic fields – also emitted at high levels from handheld gadgets, such as eReaders and mobile phones – as a risk factor for childhood leukemia. Given the 2001 very close votes (9 to 11) for moving it to 2A and all the new knowledge that has accumulated since 2001, today the association between childhood leukemia and power-frequent (ELF) electromagnetic fields would definitely be signed into the much more serious 2A (“probably carcinogenic”) category. So, the ‘red flag’ is – unfortunately – flying very high.

3. Involuntary exposure of children.

According to Article 24 of the UNICEF’s Child Convention “children have the right to ... a clean and safe environment and information to help them stay healthy”. We must all ensure that this article never is violated. This is about our social responsibility, and is very much a public health issue.

Many Wi-Fi systems are close to beds, kitchens, playrooms, schoolrooms, and similar locations. These wireless systems are never off, and the exposure is not voluntary. They are being forced on citizens and their children everywhere. Based on this, the inauguration of wireless systems with the involuntary exposure of millions to billions of human beings to pulsed microwave radiation should immediately be prohibited until ‘the red flag’ can be hauled down once and for all.

There has been insufficient public debate about whether children actually need these wireless applications in their school work or if there are pedagogic rationales supported by professional teachers



behind these ‘modernizations’. There should be debate rather than decision-making over parents’ heads. It is the children (and their staff!) who will suffer the potential health consequences of living every minute in all these exposures from Wi-Fi, and similar wireless installations, and they have no choice in the matter. Approved man-made microwave exposures are one million billion times – or more – larger than natural evolutionary background levels, the latter being as low as $0.00000000001 \mu\text{W}/\text{m}^2$.

4. Conclusions

-- Electrosensitivity is recognized as a disability in Sweden. People with EHS have varying degrees of disability.

--The evidence for non-thermal adverse effects on human health is overwhelming and the Precautionary Principle should be immediately reflected in guidelines for public and occupational EMF exposures.

-- Children are at particular risk and preventative measures ensuring minimal EMF exposure should be of the highest priority.

I encourage governments and local health and educational bodies, including in Canada, to adopt a framework of guidelines for public and occupational EMF exposure that reflect the Precautionary Principle. As noted, the Precautionary Principle states when there are indications of possible adverse effects, though they remain uncertain, the risks from doing nothing may be far greater than the risks of taking action to control these exposures. The Precautionary Principle shifts the burden of proof from those suspecting a risk to those who discount it — as some nations have already done. Precautionary strategies should be based on design and performance standards and may not necessarily define numerical thresholds because such



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thresholds may erroneously be interpreted as levels below which no adverse effect can occur.

Some 100 years back, we learned the hard lessons of ionizing radiation and the need for strict health protections – now we must openly face the possibility that we must take a seat in life’s school and learn again. This time it is about non-ionizing radiation.

I would be glad to provide further comments and reply to any queries.

Respectfully submitted,
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