

Ask Jon Eakes

# Scientists in Quebec take stands on both sides of the EMF debate.

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Follow this link for a background and an overview of the debate on EMF and human health.

The debate is strong in Québec. A large group of scientist and engineers worried about what they consider the unfounded public outcry against wireless progress published a letter in the newspaper LeDevoir on May 24, 2012 to set the record straight about all the misinformation claiming negative health effects created by the Hydro Smart Meters as well as cell phones and Wi-Fi transmitters.

Two weeks later another large group of scientists and engineers published a reply to set the record straight about the misinformation spread by the first group of scientists - claiming enough scientific proof about health effects of EMF does exist to justify immediate caution and control with radio frequency technologies.

Here, without comment, are both of their letters in English.

For Smart Meters, cell phones and WiFi

The original pro-cell phone/smart meter letter was published in the Devoir on 24 May 2012:

<http://www.ledevoir.com/environnement/actualites-sur-l-environnement/350726/pour-un-debat-guide-par-la-science>

Text in English:

We are a group of scientists and engineers concerned with the perception of the health hazards of electromagnetic waves with frequencies between 3 kHz and 300 GHz (hereinafter called "RF") in Quebec and elsewhere in the world.

We regret that the real issues for society about the use of radio frequency communication systems are overshadowed by the single issue of the alleged effects of these waves on health. We believe that concerns over radio frequencies are based mainly on 1. a misunderstanding of the nature of these waves and their interactions with the human body, 2. a misreading of the scientific literature on the subject, and 3. a distrust of local, national and international public health agencies. It would be unfortunate that political or economic decisions important to our nation are taken in a climate of fear rather than the result of composed scientific reasoning. We therefore hope that this open letter will help reduce the perception of danger posed by these waves to allow the debate to progress in a responsible, informed by the scientific approach. "Smart" meters Since the beginning of 2012, the topic of the health effects of RF is ubiquitous in the Quebec media. Latent concerns of our citizens have been exacerbated by the announcement of Hydro-Quebec's imminent installation of 3.8 million so-called "smart" meters in Quebec homes. These meters transmit at frequencies very close to those used by cellular phones and wireless routers (WiFi). As for the emission intensity, Hydro-Québec certifies that it is about 100,000 times below Canadian standards. Yet, several citizens' groups continue to proclaim loudly and clearly that these meters are dangerous. A petition seeking a moratorium on the installation of smart meters, registered in the National Assembly of Quebec, collected about 10,000 signatures in January 2012. Those proposing the moratorium are following the lead of Santa Cruz County, California, which on January 25, 2012 declared a one-year moratorium on the installation of smart meters in homes. Disagreement The main arguments against the installation of smart meters, as noted in the media and relating to their alleged health effects, are as follow. We report them in good faith, but we disagree with them. 1. Some studies show that cell phone use increases the risk of brain cancer among users. In addition, the International Agency for Research on Cancer (IARC) classifies electromagnetic waves in category 2B, or possibly carcinogenic to humans. Thus, it would be better to apply the precautionary principle and reduce our exposure to these waves.

2. Some people report health problems (stress, headaches, insomnia, heart palpitations) which they attribute to the presence of RF in their environment. This condition is commonly called electromagnetic hypersensitivity (EHS). It is argued that it could become much more common with the installation of smart meters. 3. The current safety standards do not take into account non-thermal biological effects, that is to say, the effects other than simple heating of tissue after exposure to radio waves. They ignore, also, cumulative effects in the body of a long-term exposure to these waves. 4. Unlike a cell phone or a wireless router, citizens have no control over smart meters that will emit waves up to 1500 times a day for 0.06 seconds each time (about 90 seconds of total emissions per day). In addition, Hydro-Quebec is only measuring average intensities of radiation and is not concerned with peak intensities which are much higher. 5. The decision to impose smart meters was taken without any real debate in society and in particular without the participation of the Office of Public Hearings on the Environment (BAPE) or independent research commissions. Not proof Claims and actions of several citizens groups are based in whole or in part on these arguments. As scientists, we need to recall important facts about the scientific process and the publishing process dear to our disciplines.

It is true that in each case above, a number of scientific publications report observations of concern, but that these observations are by no means amounted to the level of evidence. Publication by one or more researchers of a study in a refereed journal does not constitute evidence of an effect. It does not mark the end of a scientific debate, but rather its beginning.

Only after subsequent replication of experimental results by several independent scientists may a consensus gradually arise in the community. As for the arguments presented above, expert opinions we represent allow us to respond point by point: In response to 1. : Thousands of studies, both epidemiological and experimental in humans, show no increase in cancer cases as a result of exposure to radio waves of low intensity, that is to say, at intensities equal to or less than those emitted by cell phones. Some specific studies showing a direct link between RF and health have been published, but they are severely criticized by the scientific community and have not yet been independently replicated. Moreover, despite increasing use of cell phones, the overall incidence of brain cancer has not increased in recent years. These points have been widely discussed in the reports of WHO, by the French Agency for Health and Safety in the work environment (AFSSET) and, closer to home, in the public health opinion published by the Quebec Department of Health and Social Services (MSSS) March 16, 2012. In response to 2. : WHO and the MSSS also issued clear advice regarding electromagnetic hypersensitivity, namely that the condition exists, but that it comes from anxiety about the existence of RF sources in the person's close environment, and not from a verifiable effect of waves on the body.

There is no convincing evidence that anyone is able, in a blind test, to recognize the presence of these waves by their effects on his body. In response to 3. : In biophysics, there is no established mechanism by which a radio wave could induce an adverse effect on human tissue other than by heating (thermal effects). Moreover, unlike ionizing radiation (X-ray, UV, gamma), there is no indication that radio frequency radiation causes chemical or physical damage that are "bioaccumulative". In response to 4. : The measurement of intensity to advocate in a case like this is the measure of the average intensity of exposure. Any other approach, such as measuring the peak intensity or the absolute number of pulses, gives an alarmist bias to the results. Moreover, if we consider that a debate should take place, it should focus exclusively on the effects of cell phones on health. Even if the power levels involved in these are also low, they are by their proximity to the body, a source of exposure greater than the sum of all other RF sources in the urban environment. In response to 5. : In the particular case of smart meters, we are all agreed that a moratorium and a public commission largely dominated by the issue of radio frequency effects on health would do nothing but repeat what has already been said elsewhere : that is to say that there is no clear link between exposure to radio frequencies (below the prescribed standards) and health problems whatsoever. We are particularly concerned that such a moratorium on smart meters based on health reasons leads, by direct analogy to a moratorium on Wi-Fi transmitters in the urban environment. If we condemn these meters, then it is logical we also condemn WiFi transmitters, cell phones, cordless

phones and microwave ovens, since all these devices emit radio frequencies to equal levels of intensity or higher than that of smart meters. We believe that such measures would constitute a major socio-economic decline without any significant benefit to health or the environment. Finally, we believe that the current debate on radio frequencies and human health has the effect of masking the real issues around the installation of these meters. These issues are, in our opinion, economic, political and technical: to prove beyond doubt the economic viability of the project for Quebec; convince people that the installation of new meters will not result in higher electricity costs to the taxpayer and ensure quality, durability and security (IT) facilities. We trust other experts to answer these questions that are not strictly scientific. \*\*\* Have signed this text the following scientists: Thomas Gervais, Richard Leonelli, Jean-Jacques Laurin, Lorne Trottier, Pierre Savard, Leon Sanche, Normand Mousseau, Joe Schwarcz, Kaspi, Matt Dobbs, Panagiotis Vasilopoulos, Ricardo Izquierdo, Andrew Kirk, Guy Marleau, Alain Pignolet, Yves-Alain Peter, Michel Perrier, Sjoerd Roorda, Michel Côté, David Senechal, Martin Grant, Rene Cote, Frank P. Ferrie, Ariel Fenster, Richard Martel, Gregory De Crescenzo, Richard Gourdeau, Mohamad Sawan, Nicolas Saunier, Guchuan Zhu, Andre-Marie Tremblay Pierre Carreau, Georges-Émile April, Frédéric Sirois, Alain Rochefort, Michel Piché, Jason Robert Tavares, Michael D. Buschmann, Marc Laforest, Jean-François Frigon, Robert Guardo, Denis Mitchell, Peter Grütter, Jim Cline, David Cooke, Charles Gale, Andreas Warburton, David Covo, Keith Vanderlinde, Dominic Ryan, David A. Lowther, David Ronis, Khaled Arfa, Nicolas Godbout, Pierre Baptiste, Ken Ragan, David Hanna, Jean-Philip Lumb and Benoit Boulet.

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For the Precautionary Principle of slowing down with Smart Meters, Cell Phones and Wi-Fi. The response was published 11 June 2012 by the Maison du 21 Siècle: [www.maisonsaine.ca/sante-et-securite/electrosmog/smart-meters-correcting-gross-misinformation.html](http://www.maisonsaine.ca/sante-et-securite/electrosmog/smart-meters-correcting-gross-misinformation.html)

#### Smart Meters: Correcting the Gross Misinformation

Quebec-based magazine La Maison du 21e siecle asked physician David O. Carpenter, former founding dean of the University at Albany (NY)'s School of Public Health, to comment an open letter published in the Montreal daily Le Devoir last May 24. This letter claimed wireless smart meters pose no risk to public health. Some forty international experts contributed to the following rebuttal.

We, the undersigned are a group of scientists and health professionals who together have coauthored hundreds of peer-reviewed studies on the health effects of electromagnetic fields (EMFs). We wish to correct some of the gross misinformation found in the letter regarding wireless "smart" meters that was published in the Montreal daily Le Devoir on May 24. Submitted by a group Quebec engineers, physicists and chemists, the letter in question reflects an obvious lack of understanding of the science behind the health impacts of the radiofrequency (RF)/microwave EMFs emitted by these meters. The statement that « Thousands of studies, both epidemiological and experimental in humans, show no increase in cancer cases as a result of exposure to radio waves of low intensity... » is false (1). In fact, only a few such studies - two dozen case-control studies of mobile phone use, certainly not thousands, have reported no elevations of cancer, and most were funded by the wireless industry. In addition, these reassuring studies contained significant experimental design flaws, mainly the fact that the populations followed were too small and were followed for a too short period of time. Non industry-funded studies have clearly demonstrated a significant increase in cancer cases among individuals who have suffered from prolonged exposure to low-level microwaves, transmitted notably by radio antennas. The effects were best documented in meta-analyses that have been published and that include grouped results from several different studies: these analyses consistently showed an increased risk of brain cancer among regular users of a cell phone who have been exposed to microwaves for at least ten years.

#### Brain Cancer Rates

Furthermore, the argument that brain cancer rates do not indicate an overall increase in incidence is not evidence that cell phones are safe: the latency for brain cancer in adults after environmental

exposure can be long, up to 20-30 years. Most North Americans haven't used cell phones extensively for that long. The evidence of the link between long-term cell phone use and brain cancer comes primarily from Northern Europe, where cell phones have been commonly used since the 1990s. Nevertheless, the most recent collection of primary brain tumors mined from pathology units in Australia showed brain cancer incidence rose by about 35% between 2000 and 2008 in the Australian Capital Territory and New South Wales (total population : more than 7 million).

Children are especially at risk. In May 2012, the U.K.'s Office of National Statistics reported a 50 percent increase in incidence of frontal and temporal lobe tumors in children between 1999 and 2009. This statistic is especially disturbing since in May 2011, after reviewing the published scientific literature regarding cancers affecting cell phone users, the International Agency for Research on Cancer (IARC) classified radiofrequency radiation as a 2B, possible human carcinogen. Despite the absence of scientific consensus, the evidence is sufficiently compelling for any cautious parent to want to reduce their loved one's exposure to RF/microwave emissions as much as possible, as recommended by various countries such as Austria, Belgium, Germany, Russia and the United Kingdom.

### Electrosensitivity

Public fears about wireless smart meters are well-founded. They are backed by various medical authorities such as those of the Santa Cruz County(California) Public Health Department. These authorities are worried about the growing number of citizens who say they have developed electrohypersensitivity (EHS), especially since for many of them, the symptoms developed after the installation of such meters (it takes some time for most people to link the two events).

Since the turn of the millennium, people are increasingly affected by ambient microwaves due to the growing popularity of wireless devices such as cell phones and Wi-Fi Internet. Therefore, the mass deployment of smart grids could expose large chunks of the general population to alarming risk scenarios without their consent. According to seven surveys done in six European countries between 2002 and 2004, about 10% of Europeans have become electrosensitive. The most famous person to publicly reveal her electrosensitivity is Gro Harlem Brundtland, formerly Prime Minister of Norway and retired Director of the World Health Organization (WHO).

While there is no consensus on the origins and mechanisms of EHS, many physicians and other specialists around the world have become aware that EHS symptoms (neurological dermatological, acoustical, etc.) seem to be triggered by exposure to EMF levels well below current international exposure limits, which are established solely on short-term thermal effects (2). Organizations such as the Austrian Medical Association and the American Academy of Environmental Medicine have recognized that the ideal way to treat of EHS is to reduce EMF exposure.

Therefore, caution is warranted because the growing variety of RF/microwave emissions produced by many wireless devices such as smart meters have never been tested for their potential biological effects.

### Well-known bioeffects

While the specific pathways to cancer are not fully understood, it is scientifically unacceptable to deny the weight of the evidence regarding the increase in cancer cases in humans that are exposed to high levels of RF/microwave radiation.

The statement that « there is no established mechanism by which a radio wave could induce an adverse effect on human tissue other than by heating » is incorrect, and reflects a lack of awareness and understanding of the scientific literature on the subject. In fact, more than a thousand studies done on low intensity, high frequency, non-ionizing radiation, going back at least fifty years, show that some biological mechanisms of effect do not involve heat. This radiation sends signals to living tissue that stimulate biochemical changes, which can generate various symptoms and may lead to diseases such as cancer.

Even though RF/microwaves don't have the energy to directly break chemical bonds, unlike ionizing radiation such as X-rays, there is scientific evidence that this energy can cause DNA damage

indirectly leading to cancer by a combination of biological effects. Recent publications have documented the generation of free radicals, increased permeability of the blood brain barrier allowing potentially toxic chemicals to enter the brain, induction of genes, as well as altered electrical and metabolic activity in human brains upon application of cell phone RF/microwaves similar to those produced by smart meters.

These effects are cumulative and depend on many factors including RF/microwave levels, frequency, waveform, exposure time, biovariability between individuals and combination with other toxic agents. Clear evidence that these microwaves are indeed bioactive has been shown by the fact that low-intensity EMFs have proven clinically useful in some circumstances. Pulsed EMFs have long been used to successfully treat bone fractures that are resistant to other forms of therapy. More recently, frequency-specific, amplitude-modulated EMFs have been found useful to treat advanced carcinoma and chronic pain.

High frequency EMFs such as the microwaves used in cell phones, smart meters, Wi-Fi and cordless "DECT" phones, appear to be the most damaging when used commonly. Most of their biological effects, including symptoms of electrohypersensitivity, can be seen in the damage done to cellular membranes by the loss of structurally-important calcium ions. Prolonged exposure to these high frequencies may eventually lead to cellular malfunction and death.

Furthermore, malfunction of the parathyroid gland, located in the neck just inches from where one holds a cell phone, may actually cause electrohypersensitivity in some people by reducing the background level of calcium ions in the blood. RF/microwave radiation is also known to decrease the production of melatonin, which protects against cancer, and to promote the growth of existing cancer cells.

Early warning scientists attacked

In recommending that the Precautionary Principle be applied in EMF matters, the European Environment Agency's Director Jacqueline McGlade wrote in 2009: "We have noted from previous health hazard histories such as that of lead in petrol, and methyl mercury, that 'early warning' scientists frequently suffer from discrimination, from loss of research funds, and from unduly personal attacks on their scientific integrity. It would be surprising if this is not already a feature of the present EMF controversy... » Such unfortunate consequences have indeed occurred.

The statement in the Le Devoir letter that « if we consider that a debate should take place, it should focus exclusively on the effects of cell phones on health » is basically an acknowledgement that there is at least some reason to be concerned about cell phones. However, while the immediate exposure from a cell phone is of much greater intensity than the exposure from smart meters, cell phone use is temporary.

Smart meters

As Australian Associate Professor of neurosurgery Vini G. Khurana reports, adverse neurological effects have been reported in people who sustain close proximity to wireless meters, especially under 10 feet (3 metres).

A wireless smart meter produces radiofrequency microwave radiation with two antennas in approximately the same frequency range (900 MHz to 2.4 GHz) as a typical cell tower. But, depending on how close it is to occupied space within a home, a smart meter can cause much higher RF exposures than cell towers commonly do. If a smart meter is located on a common wall with a bedroom or kitchen rather than a garage wall, for example, the RF exposure can be the same as being within 200 to 600 feet distance of a cell tower with multiple carriers. With both cell towers and smart meters, the entire body is immersed by microwaves that go out in all directions, which increases the risk of overexposure to many sensitive organs such as the eyes and testicles. With a cell phone, people are exposed to microwaves primarily in the head and neck (unless using speaker mode), and only when they use their device. In addition, near-field exposures are more unpredictable than far-field exposures because of the unstable wavelengths found very close to RF sources such as cell phones and smart meters.

Wireless smart meters typically produce atypical, relatively potent and very short pulsed RF/microwaves whose biological effects have never been fully tested. They emit these millisecond-long RF bursts on average 9,600 times a day with a maximum of 190,000 daily transmissions and a peak level emission two and a half times higher than the stated safety signal, as the California utility Pacific Gas & Electric recognized before that State's Public Utilities Commission. Thus people in proximity to a smart meter are at risk of significantly greater aggregate of RF/microwave exposure than with a cell phone, not to mention the cumulative exposure received by people living near multiple meters mounted together, pole-mounted routers or utility collector meters using a third antenna to relay RF signals from 500 to 5,000 homes.

A technical study performed by Sage Associates in California indicates that RF levels from various scenarios depicting normal smart meter installation and operation may violate even the out-of-date US public safety standards which only consider acute thermal effects. This can happen when a person stands close to the meter to read the power consumption, or touches it, or shades the meter face with a hand to better read it. Emissions are also increased by reflective materials, such as stainless steel, other metals and mirrors, which can re-radiate stronger than the otherwise unaltered background. Microwaves are absorbed and dissipated by partially conductive materials, such as cement and special RF shielding paints and fabrics.

In addition to the erratic bursts of modulated microwaves emitted by wireless smart meters transferring usage data to electric, gas and water utilities, wireless as well as wired smart (powerline communication) meters are also a major source of "dirty electricity" (electrical interference of high frequency voltage transients typically of kilohertz frequencies). Some scientists, such as American epidemiologist Sam Milham, believe that many of the health complaints about smart meters may also be caused by dirty electricity generated by the « switching » power supply activating all smart meters. Since the installation of filters to reduce dirty electricity circulating on house wiring has been found to relieve symptoms of EHS in some people, this method should be considered among the priorities aimed at reducing potential adverse impacts. Indeed, the Salzburg State (Austria) Public Health Department confirms its concern about the potential public health risk when in coming years almost every electric wire and device will emit such transient electric fields in the kilohertz-range due to wired smart meters.

Rather be safe than sorry

The apparent adverse health effects noted with smart meter exposure are likely to be further exacerbated if smart appliances that use wireless communications become the norm and further increase unwarranted exposure.

To date, there have been few independent studies of the health effects of such sources of more continuous but lower intensity microwaves. However, we know after decades of studies of hazardous chemical substances, that chronic exposure to low concentrations of microwaves can cause equal or even greater harm than an acute exposure to high concentrations of the same microwaves.

This is why so many scientists and medical experts urgently recommend that measures following the Precautionary Principle be applied immediately - such as using wired meters - to reduce biologically inappropriate microwave exposure. We are not advocating the abolishment of RF technologies, only the use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards. 1. Scientific papers on EMF health effects 2. Explanation and studies on electrosensitivity 3. Governments and organizations that ban or warn against wireless technology

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