David M. Aaron

March 22, 2013

BY EMAIL

BC Utilities Commission
Sixth Floor, 900 Howe Street, Box 250
Vancouver, BC V6Z 2N3

Attention: Erica Hamilton, Commission Secretary

Dear Sirs / Mesdames:

Re: FortisBC Inc. Application for a Certificate of Public Convenience and Necessity for the Advanced Metering Infrastructure Project ~ Project No.3698682

Please find attached material we are providing in fulfillment of the undertaking of Doctor Jamieson in these proceedings.

Yours truly,

DAVID M. AARON
Encl.

cc: clients
cc: FortisBC Inc.
cc: Interested Parties

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Dr Isaac Jamieson's Response to B.C. Pensioner and Senior's Organization, BC Coalition of People with Disabilities, Counsel of Senior Citizens' Organizations, and the Tenant Resource and Advisory Centre

There are potential strengths, weaknesses and biases to be addressed in every type of scientific study.

C.1 Funding bias

When wishing to address possible issues of bias, it is also necessary to provide an overview of the situation that may exist in general as related to funding bias and study correlations. The qualitative and quantitative review by Ledford (2010) indicates that there often appears to be a significant relationship between the source of funding, or author affiliation, and whether correlations are found between RF/microwave exposure and health effects (Figure C.1).

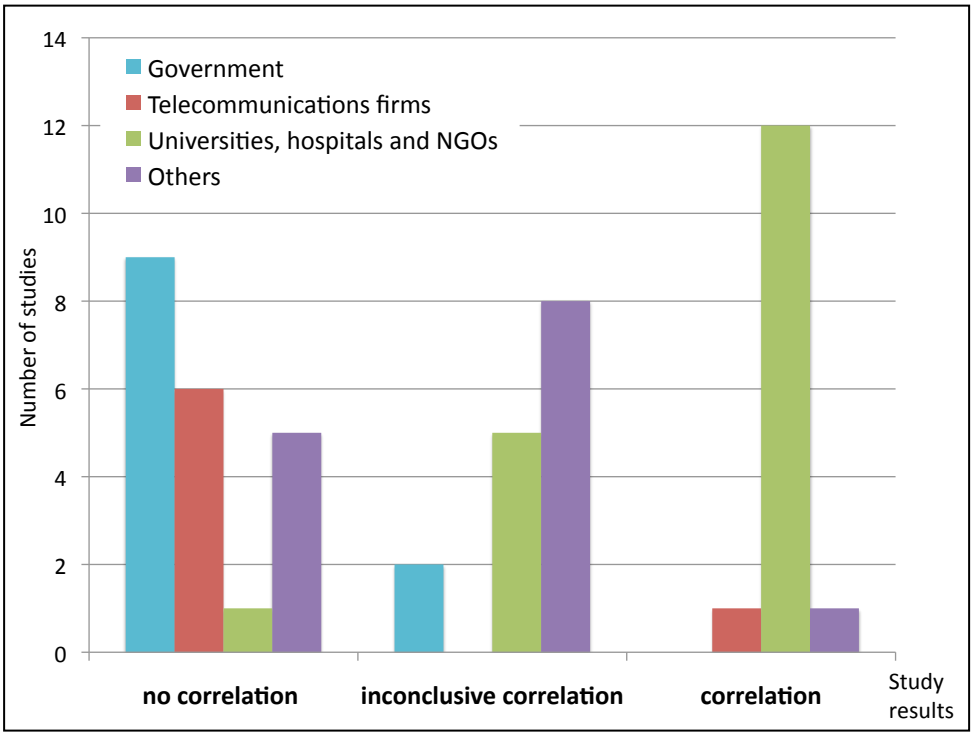


Figure C.1: Study results of correlation between RF/microwave exposure and health by author affiliation

In that work, it was shown that the research funded by or affiliated with either government or telecommunications firms was more likely not to find a correlation between ill health (in the case of their research with regard to cancer) and increased exposure to RF/microwave emissions. In contrast, studies funded by or affiliated with universities, hospitals or NGOs were more likely to find a

correlation. Additionally, studies funded by or affiliated with 'others', such as magazines or businesses, were more likely to find inconclusive correlations. Similar findings were made by Huss et al. (2007), investigating additional health effects, who additionally noted that "single-source sponsorship is associated with outcomes that favor the sponsors' products."

It may have proved informative, had time and resources permitted, to be able to investigate to a greater degree to what extent funding bias may exist in countries where far lower RF/microwave exposure guidelines exist. In China, for instance, out of 109 epidemiological studies covering the period of 1994-2006, 108 noted health effects in humans as a result of EMF exposure (Cao 2007). Almost all of the epidemiological studies undertaken in China, discussed above, were funded through non-industrial sources (Cao 2013).

The Bavarian study (Eger & Jahn 2010) was solely funded by the Administration of the Bavarian Municipality of Selbitz, and that of the Spanish study (Oberfeld et al. 2004) by a grant from the Spanish Ministry of Science and Technology.

As noted by Huss et al. (2007), "*The interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship into account*."

C.2 Confirmation bias

Assessment of risk should also take into account confirmation bias and psychological denial that may hamper effective decision-making and may inadvertently lead to wrong (and often expensive to correct) decisions being taken. It is important to recognize that though there are marked biases noted above in relation to cancer correlations (and other health problems) with regard to RF/microwave radiation; IARC acknowledged shortly after their 2011 press release that as smart meters emit the same type of radiation as mobile phones, they also fall under the Group 2B classification (i.e. RF/microwave radiation from smart meters is still considered a cancer hazard, and under IARC terms is still a 'carcinogen').

C.3 Oberfeld et al. (2004): '1.1.3. Spanish Study'

Reference was made of the Oberfeld et al. (2004) study in the original commentary by Dr Jamieson primarily because of the types of statistical analysis undertaken and its use of actual data on the RF/microwave field levels encountered within the dwellings of participants. If such measurements could also have been taken for the Eger & Jahn (2010) study, it could further have increased the resolution of the detailed information sets that were gathered. The work of Oberfeld et al. (2004) investigated further aspects of earlier research by Navarro et al. (2003) which investigated what associations might exist between raised exposures to RF/microwave radiation and health symptoms.

C.3.1 Selection bias

In that work over 5% of the population of La Ñora in Spain answered the questionnaires, which were distributed by a local team specially trained in such work. The questionnaires were given out by the team in frequently used locations (hair dresser, pharmacy). It was acknowledged by Oberfeld et al. (2004) that "Some kind of selection bias cannot be ruled out, because of the way the questionnaires were distributed, but that would affect more or less all cases and therefore affect the odds ratios not substantially."

It was stated that individuals were generally quite prepared to take part in the survey, with a ratio of returned to received questionnaires being very high at around 70%. As noted by Navarro et al. (2003), care was taken to ensure that questionnaires returned by individuals with a history of deep

psychological or neurological disease were excluded from the surveys used for validation to help avoid potential skewing of results.

Even though a high percentage of response was obtained, claims of potential bias could be raised, as the participants would be directly aware from the questions being asked that the investigation were related to whether relationships may exist between raised exposures to different types of EMF radiation and health symptoms. Similar claims of reporting bias might be levelled at many studies, as an example, the large-scale long term international COSMOS (cohort study of mobile phone use and health) study (UK COSMOS 2013) – which has been globally identified as a priority by many agencies including the WHO - also openly declares that it is investigating if there are any health issues linked to RF/microwave radiation exposures.

C.3.2 Questionnaires used

The questionnaire used in the Spanish research was a direct translation of the EMF health questionnaire by Santini (2002). The data it requested included: address, age, gender, distance to cell phone base stations and exposure time (years, days per week, hours per day); whether living within 100m of high-voltage powerlines; whether living within 10m of a transformer; whether living within 4km of a radio/TV station; whether using a computer >2h/day; or using of cell-phone >20 minutes/day. A symptom checklist (with scoring of 0-5 where: 0 = never, 1 = sometimes, 2 = often, 3 = very often) was also given to provide information on the frequency of 16 health-related symptoms, many of which are described as symptoms of 'microwave/radiofrequency syndrome/sickness' (Oberfeld et al. 2004).

The questionnaires were distributed in October/November 2000 in La Ñora and collected in November/December of that year. As a result of the 144 questionnaires that were returned, 97 measurements were undertaken in participants' bedrooms in 2001. The loss of 47 subjects from the original set of returns was due to either: the names or addresses that were given being illegible so it was impossible to make contact; the respondents not being willing to have measurements taken; not being home at scheduled appointment time for measurements to be taken; or because symptoms of the health questionnaire were checked with an "x" instead of the required numbers '0', '1', '2', or '3'. In 2004 the analysis of the La Ñora data set was undertaken with n=94 subjects providing complete information on exposure values from 2001, age, gender and symptoms, with the exception of one subject (for whom all information was available with the exception of information related to the 'skin disorder question') causing the data set to be n=93.

C.3.3 Possible confounders

Among the factors assessed in the Spanish study that might act as confounders and bias health response were: proximity to powerlines; personal use of computer; and cell phone use. It was noted by Oberfeld et al. (2004) that some of those variables provided "*a significant contribution to the explanation of the model (data not shown) for few of the symptom variables which did not alter the overall associations of the models presented …"* Those researchers recommended that in future research exposure to powerlines and transformers, as well as to radio / TV transmitters, should be assessed on an individual level in order to reduce the possibility of exposure misclassification.

To help address potential bias and also to provide comprehensive data sets, the original study by Navarro et al. (2003) measured RF/microwave electric field levels in the bedrooms of 97 of the study participants in 2001 to help determine to what extent symptoms might be linked with actual exposures (additional readings were also undertaken outdoors to check for possible temporal variability). Those readings were further analyzed in Oberfeld et al. (2004)'s work, alongside with the findings of new frequency selective measurements undertaken in 2004 in the bedrooms of 6 former study participants (the rooms being measured were randomly selected from the different exposure groups as determined from the 2001 electric field measurements).

C.3.4 Unadjusted vs. Adjusted Analyses

Oberfeld et al. (2004) applied multiple logistic regression analysis to assess the odds ratio (OR) of health outcome in relation to exposure to RF/microwave radiation at frequencies from 400MHz to 3GHz, comparing intermediate-exposure (0.0006-0.0128μW/cm^2) and high-exposure (0.0165-0.44μW/cm^2) categories with a low-exposure (0.0001-0.0004μW/cm^2) category used as a reference. They found that the odds ratio results of the surveyed health outcome are broadly similar between those obtained from unadjusted analyses and analyses after adjustment for confounders listed in C.3.2 (i.e. age, gender and distances to the nearest cell-phone base station), as well as possible additional confounding factors (living within 100m to high-voltage powerlines, living within 10m of a transformer, living within 4km of a radio/TV station, use of computer >2h/day or use of cell-phone >20 minutes/day).

Only slight changes were found in the odds ratios associated with the measured exposures between unadjusted and adjusted analyses. Reasons for this cannot be given with certainty, and could be partially explained by the equal gender distribution (47 males and 47 females) and relatively well distributed ages of participants (14-81 years old with a median[1] of 39 years old). When the analyses included distance in addition to age and gender variables, the reversed distance was shown to only have a statistically significant relationship to 'sleeping disorders' and to 'dizziness' out of the 16 surveyed symptoms. However, as suggested by the odds ratios obtained, its possible influence on those two symptoms appear to be extremely low compared to the measured fields strengths. One of the reasons for this could possibly be that the measured field strengths were more correlated to the symptoms than that for the reversed distances with some degrees of inter-correlation between those two variables (field strength and distance).

Likewise, only some of the investigated possible confounding factors were found to be statistically significant in relation to some symptoms, but did not alter the overall associations. To reduce exposure misclassification, Oberfeld et al. (2004) then suggested that for future studies the exposure levels to frequencies emitted from powerlines, transformers and radio/TV stations should also be measured on an individual level.

[1] the numerical value separating the higher half from the lower half of a sample.

C.3.5 Table 1.3, page 12 in Dr Jamieson's report.

Errata are shown in red.

Table 1. 3 Age, gender and distance adjusted model (Oberfeld et al. 2004).

Health Outcome	0.05-0.22 V/m (0.0006-0.0128 μW/cm²)			0.25-1.29 V/m (0.0165- 0.4400 μW/cm²)		
	OR	95%-CI	*p*	OR	95%-CI	*p*
Difficulty in Concentration	8.27	2.01 – 34.01	0.0034	19.17	4.91 – 74.77	0.0000
Feeling of Discomfort	4.29	1.14 – 16.15	0.0314	10.90	3.16 – 37.56	0.0002
Sleeping Disorder	10.39	2.43 – 44.42	0.0016	10.61	2.88 – 39.19	0.0004
Irritability	3.12	0.91 – 10.68	0.0704	9.22	2.86 – 29.67	0.0002
Depressive Tendency	39.41	4.02 – 386.40	0.0016	59.39	6.41 – 550.11	0.0003
Fatigue	28.53	3.03 – 268.78	0.0034	40.11	4.56 – 352.44	0.0009
Loss of Appetite	6.66	0.62 – 71.52	0.1175	27.53	3,07 – 247.03	0.0031
Loss of Memory	2.35	0.62 – 8.89	0.2090	7.81	2.27 – 26.82	0.0011
Headaches	5.99	1.50 – 23.93	0.0113	6.10	1.80 – 20.65	0.0037
Dizziness	2.98	0.62 – 14.20	0.1712	8.36	1.95 – 35.82	0.0042
Visual Disorder	2.48	0.65 – 9.44	0.1830	5.75	1.68 – 19.75	0.0054
Cardiovascular Problems	9.42	0.93 – 95.07	0.0572	17.87	1.96 – 162.76	0.0105
Nausea	5.92	0.60 – 58.68	0.1288	12.80	1.48 – 110.64	0.0205
Skin Disorder	7.04	1.06 – 46.62	0.0429	8.22	1.39 – 48.51	0.0201
Hearing Disorder	3.89	0.99 – 15.21	0.0510	1.63	0.45 – 5.95	0.4572
Gait Difficulties	1.32	0.30 – 5.84	0.7114	2.07	0.57 – 7.50	0.2690

Odds Ratio (OR)
"An odds ratio (OR) is a measure of association between an exposure and an outcome. The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure." (Szumilas 2010).

OR = 1 Exposure does not affect odds of outcome
OR > 1 Exposure associated with higher odds of outcome
OR < 1 Exposure associated with lower odds of outcome

95% CI (Confidence Interval)
95% CI is the range within which there is 95% certainty that the true value for the whole population of interest lies. Generally the lower 95% confidential and upper 95% confidential values are reported.

***p*-value**
$p < 0.05$: statistically significant
$p < 0.001$: statistically highly significant

$p<0.05$ means there is a probability of less than 5 in 100 incidents that the difference between the odds may occur by chance. In other words, if a survey is repeated, for less than one in twenty incidents there might not be a measurable difference.

Odd ratios from Table 1.3 can be plotted in bar graphs as shown in Figure C.2, where dotted lines represent 95% CI.

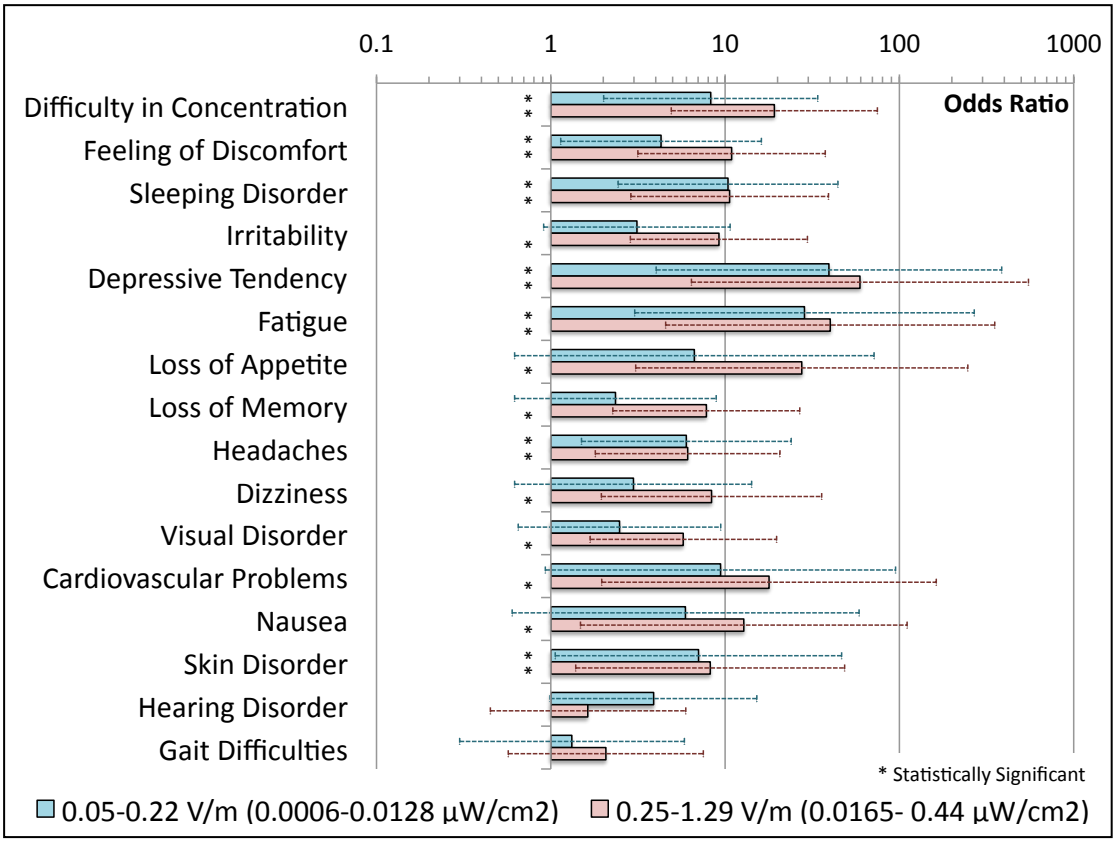
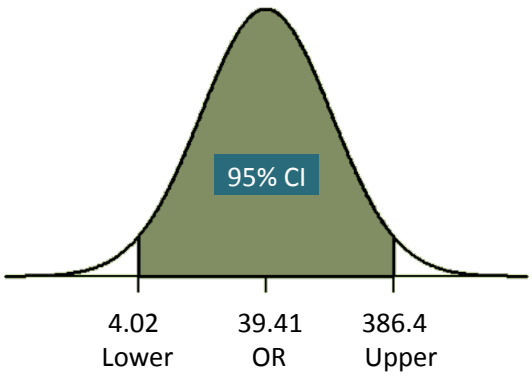


Figure C.2: Age, gender and distance adjusted model (Oberfeld et al. 2004).

Example C.1:

Odds Ratio of 'Depressive tendency' for exposure levels at 0.0006-0.0128 µW/cm^2 (intermediate exposure category)

OR (Odds Ratio) = 39.41, p = 0.0016, 95%CI (Confidence Interval) = 4.02 – 386.40



$$\text{OR} = \frac{\text{Odds that symptom occurred to people exposed to } 0.0006\text{-}0.0128\mu W/cm^2}{\text{Odds that symptom occurred to people exposed to } 0.0001\text{-}0.0004\mu W/cm^2} = 39.41$$

Odds for exposure at 0.0006-0.0128µW/cm^2 = 39.41 x Odds for exposure at 0.0001-0.0004µW/cm^2

It can be inferred from the above that people exposed to 400MHz-3GHz at a power density of 0.0006-0.0128 μW/cm^2 are almost 40-fold more likely to develop a depressive tendency than those who are exposed to the same frequency at 0.0001-0.0004 μW/cm^2, with a statistically highly significant level at p=0.0016 (which is a probability as low as 16 in 10,000 incidents that the difference between the two categories may occur by chance).

While the odds ratio is statistically highly significant, the confidence interval indicates that the magnitude of the effect could be anywhere between 4.02-fold to 386.4-fold. Though there is 95% confidence in this incidence that the true odds for people who are exposed to those frequencies at 0.0006-0.0128 μW/cm^2 would lay between those two values in comparison to the exposure at the reference power density, a larger study would be required to generate a more precise estimate of the effect.

C.3.6 Results with Statistical Significance

As can be seen from Table 1.3, for age-, gender-, distance-adjusted analyses, statistical significance for odds ratios have been shown for 7 out of 16 health-related symptoms (i.e. difficulty in concentration, feeling of discomfort, sleeping disorder, depressive tendency, fatigue, loss of appetite and headaches) indicating their association with both intermediate-exposure and high-exposure categories. An additional seven symptoms (irritability, loss of memory, dizziness, visual disorder, cardiovascular problems, nausea and skin disorder) have been found to be statistically significant for the high-exposure group.

C.3.7 Results with Non-Statistical Significance

Significance tests (p-values) can be used to inform whether a difference between odds are statistically significant, suggesting a degree of probability that the difference is due to more than chance. However, p-values do <u>not</u> imply that the difference is 'meaningful' or 'practically important'.

Example C.2:

Odds Ratio of 'Loss of memory' for exposure levels at 0.0006-0.0128 μW/cm^2 (intermediate exposure category)

OR = 2.35, p = 0.209, 95%CI = 0.62 – 8.89

For example, odds ratio for 'loss of memory' in relation to intermediate exposures (power density at 0.0006-0.0128 μW/cm^2)

The OR suggests that people who exposed to 400MHz-3GHz at a power density of 0.0006-0.0128 μW/cm^2 are up to 2.4-fold more likely to suffer from 'loss of memory' than those who exposed to the same frequency at 0.0001-0.0004 μW/cm^2. However, these odds are statistically non-significant (p=0.209), implying a probability that this may occur by chance in 21 out of 100 incidents.

It is important to recognise that results that are statistically non-significant do <u>not</u> necessarily mean 'no effect'. Small studies often show results that are statistically non-significant, even though there may be important, true effects, which large-scaled studies would have detected.

The confidence interval suggests inconsistency effects. With 95% confidence, the true odds that for some people exposed to those frequencies at 0.0006-0.0128 μW/cm^2 were less likely to suffer from loss of memory were approximately 2/5-fold lower odds (i.e. lower 95%CI=0.62, which is 0.38 times

from OR=1), whereas some people were more likely to do so with almost 9-fold higher odds (upper 95%CI=8.89).

From a '*practical importance'* point of view, should a 79% probability of 'loss of memory' possibly associated with exposure to ambient microwave radiation at power density of 0.0006-0.0128 μW/cm^2 be considered harmful to some proportion of citizens?

C.4 Eger & Jahn (2010): '1.1.2 Bavarian Study'

C.4.1 Survey design

Eger & Jahn (2010) developed their study design as a "protocol concept" for future research studies. As the participating individual groups did not differ in terms of their composition based on age or gender, it appears that the plausibility of the responses was validated within the study. It therefore appears likely that the documented results may reflect the actual distribution of the health problems encountered and that symptoms may, as indicated, increase when raised exposures are encountered.

C.4.2 Questionnaires used

Standardized health questionnaires, with 88 sets of questions on health symptoms, were sent by mail from the Selbitz Municipality in Germany to 1,080 individuals living in the municipality and surrounding areas. A quantitative scale of zero to five was used to rank each of these symptoms. These symptom groups were then summarized as more generalized groupings for the assessment. No personal interviews were undertaken.

Information on whether there were DECT (cordless) phones within dwellings was also gathered as part of the questionnaire as a potential confounder. 171 (out of the 251 participants) stated that they had such a phone and 80 said they did not. As the average age of DECT phone users (50.5 years) was significantly lower than the age of participants without such phones ($p < 0.001$). No comparison group could be formed to investigate individual relationships.

C.4.3 Use of control questions to help validate responses

The EMF-independent symptoms of 'bedwetting' and 'toothaches' which were in the survey questionnaire served as controls in order to validate the creditability of responses from participants and assess potential bias. Analysis by those authors revealed no significant differences for these symptoms for groups 1 and 2 in comparison to groups 3 and 4 or to control group 5, respectively. Those findings indicate that the questionnaires were not filled out randomly. Unlike many of the potentially EMF-related symptoms, there were no general differences between the exposed and unexposed groups in prevalence of these (EMF-independent) symptoms used as controls.

As might be expected in unbiased replies, the symptom of 'bedwetting' that was used as one of the two control questions was only noted in a very small percentage of replies and demonstrated no difference in occurrence between groups exposed to different levels of radiation.

The other control question they used was 'toothaches' which, whilst slowing little variation between the groups, had higher reported mean values of symptom score.

As only slight variations was noted between the groups for these control questions, and also for weight gain and weight loss; it appears that a trend towards voting behavior in terms of bias may be ruled out.

Selected mean values of symptom scores for the investigated symptoms groups are as shown (Figure C.3).

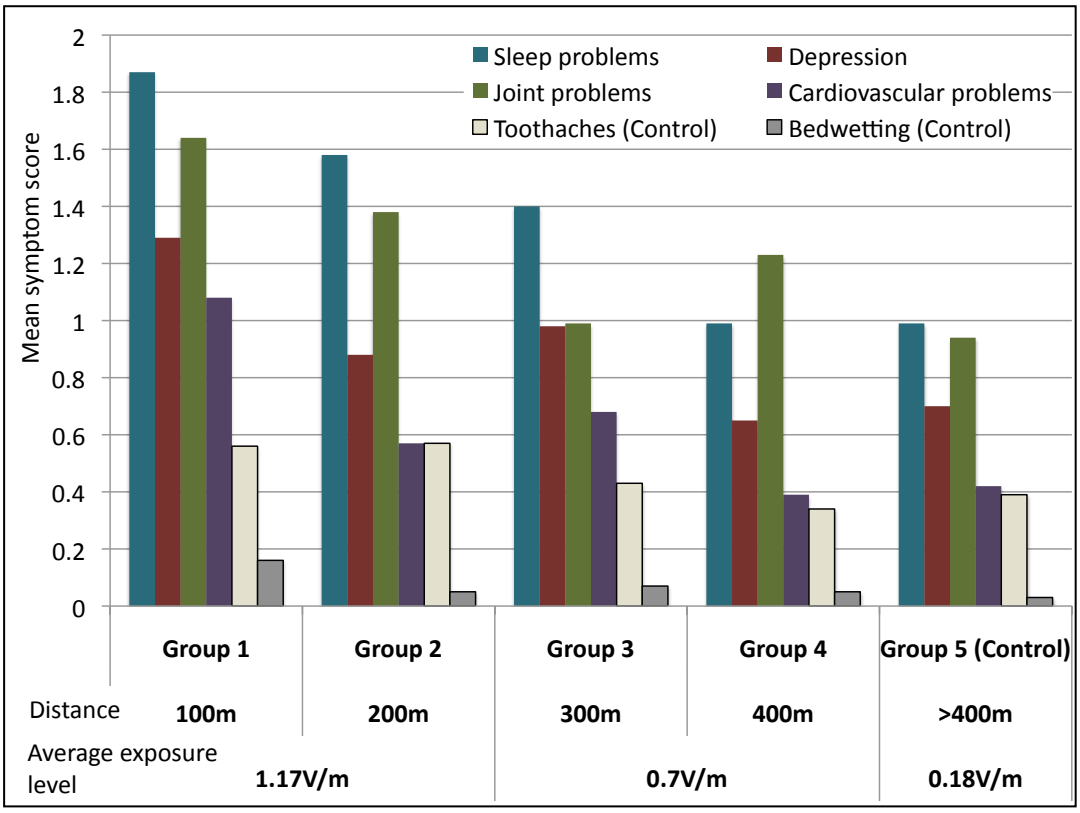


Figure C.3: Mean symptom scores of groups under different field regimes

C.4.4 Investigation of symptom scores as related to either distance or measured exposure

After participants' symptom scores were collected, Eger & Jahn (2010) determined if there were any relationships indicated between measured exposure levels or distance individuals lived from the cell phone base station and symptoms.

When comparing the mean values obtained in the symptom scores for groups 1 and 2 (mean value field-strength of 1.2 V/m) with those for groups 3 and 4 (mean value field-strength of 0.7 V/m), significant differences were found ($p < 0.01$) except for the symptoms of bedwetting, hormone imbalance, toothache, weight gain and weight loss. This finding indicates that reduced exposure levels may greatly reduce the prevalence of some health symptoms.

As noted by Eger & Jahn (2010), other studies also document clear dose-response relationships with regard to RF/microwave exposure and some health symptoms. Swiss research that they commented upon found highly significant health symptoms in members of the general public (as related to increased exposure to RF/microwave radiation including: fatigue; headaches; joint pain; and sleep problems). In blinded follow-up research to that Swiss study, the prevalence of symptoms was reduced one day after the transmitter emitting that radiation was switched off.

C.4.5 Selection bias

Officials had already received complaints about the antennae by members of the population before the study was commissioned. Seeking to help address and prevent potential selection bias, questionnaires were sent to all those within 400m of the base station. Questionnaires were also sent to randomly chosen individuals in parts of the town with very low radiation levels (Eger 2013).

"*In Selbitz municipality, there are proponents as well as critics of wireless technologies and also persons who are indifferent to it so that each group had the same opportunity to respond. The number of study participants who considered their health affected by cell phone radiation was 12% in Selbitz and, therefore, falls below the participation rate of 23%. This corresponds with a percentage of 9% as found in the DMF. Thus a selection bias was not detected*." Eger & Jahn (2010).

The above may in part help address concerns that have been raised over issues of potential selection bias influencing the responses given.

It is unfortunate that the percentage of respondents is statistically lower for group 4, which is further away from the cell phone transmitters than the first three groups. It is proposed by Dr Jamieson that this may in part be due to apathy, as that group (including both proponents and critics of wireless technologies who lived there) may have considered the matter had little to do with them. With the exception of group 4's lower response (14%), the differences between the responders/non-responders of the other individual groups and group 5 (which acted as the control) are not statistically significant (the response rates for groups 1,2,3 and 5 were 36.0%, 25.7%, 21.4% and 28.0%, respectively). Though the percentage of respondents in group 4 is less than that found with the others, there appears nothing to indicate that bias has occurred with regard to that group's composition when taking age and gender distributions into account. The response rate, even for group 4, is higher than that even found in some large-scale studies. As an example, for the UK COSMOS study, which also asks questions related to EMF exposures and health, the response rate in 2009 was 5.1% with consent (Schüz et al. 2011).

It was proposed by Eger & Jahn (2010) that in follow-up studies to their work participant response rate might be increased in follow-up studies by also undertaking phone calls or personal interviews instead of a single mail out as they had done.

Age and gender characteristics of classified groups: The age characteristics and gender ratios of the participants in the study were similar between the groups individuals were allocated to (with regard to residential location and exposure level), when compared to each other and also to the characteristics of the general population. (The average age of participants in groups 1-4 is 54.5 years, of those in the control group 52.0 years and those in Selbitz who are over 18 years of age 53.5 years. The general gender ratio for all participants was 43% male and 57% female, compared to the gender ratio for Selbitz inhabitants of 47% male and 53% female). The legitimacy of the classified groups in Eger & Jahn (2010)'s research therefore appears validated, with the statistical samples of the population appearing to be objectively represented.

C.5 Further measures to counter potential bias

It is Dr Jamieson's opinion that, with regard to issues on addressing risk of bias, reference should also be made to the study by Hutter et al. (2006), on health symptoms and RF/microwave exposures, which took measures to reduce risk of potential biases even further [*including telling participants that their study had to do with a variety of environmental factors and asking them about their opinions about the possible influences of such factors on health (so that it would be possible to later correct for any subjective bias that individual participants might have about RF/microwave radiation as a confounding factor)*]. It is interesting to note that in that work, in which between 61% and 65% of participants expressed no concern at all about RF/microwave radiation, increased health symptoms were still noted at raised exposures of 0.01-0.05 $\mu W/cm^2$.

Claims of bias could be avoided in large part, and the accuracy of studies further improved, if in addition to such measures, biological factors were also rigorously assessed as standard under different exposure regimes, i.e. with and without wireless smart meters, particularly as related to potentially vulnerable members of the population. Guidelines are already available on parameters that could be tested (Austrian Medical Association's EMF Working Group 2012). It would seem prudent to undertake such monitoring if a pilot study (on potentially vulnerable members of the public?), or groups of studies, is to be run before a wide scale roll out is considered.

C.6 References

[For consistency details are provided of studies mentioned. It is not intended for new references to be submitted as evidence].

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Dr Isaac Jamieson's Response to Commercial Energy Consumers Association of British Columbia

7.4. Please confirm that there is a very significant association of Autism with the age of the mother at the birth of the child and please provide the data supporting this if Isaac Jamieson has such data.

Agreed. A meta-analysis of 16 epidemiological papers by Sandin et al. (2012), which included 25,687 autism spectrum disorder (ASD) cases and 8,655,576 control subjects, found the following: "*Comparing mothers ≥35 years with mothers 25 to 29 years old, the crude relative risk (RR) for autism in the offspring was 1.52 (95% confidence interval [CI] = 1.12 – 1.92). Comparing mothers ⩾35 with mothers 25 to 29, the adjusted relative risk (RR) for autism in the offspring was 1.52 (95% CI = 1.12 – 1.92). For mothers <20 compared with mothers 25 to 29 years old, there was a statistically significant decrease in risk (RR = 0.76; 95% confidence interval = 0.60–0.97). Almost all studies showed a dose-response effect of maternal age on risk of autism. The meta-regression suggested a stronger maternal age effect in the studies with more male offspring and for children diagnosed in later years*." The relative risk was shown to increase with maternal age with ASD risks being greatest in male children.

A hypothesis Dr Jamieson developed as to why more male than female offspring may be susceptible to ASD as a result of RF/microwave exposure, which he had hoped to be able to discuss during his cross-examination, may explain in part why the above situation exists.

7.5. Please confirm that the age at which women have been having children has been increasing steadily for many years and at least as long as the incidence of Autism has been increasing and please provide this data if Isaac Jamieson has the data.

In Canada, in 2009, the average age that women gave birth was 29.4 years, similar to the average age women gave birth at end of WWII. Since that war the average age that women gave birth decreased till 1975, when the average age was 26.7 years and then began to increase again. Between 1975 and 2009, the average age of women giving birth in Canada increased by 2.7 years (Human Resources and Skills Development Canada 2013). As levels of Autism at the end of WWII were significantly lower than they are now, when the average age at which women gave birth was the same as in 2009, it appears that environmental factors, such as RF/microwave radiation, too may be contributing to ASD risk.

Refer also to the graphic provided in the answer given in the written response to question 8.1 in 'Dr Jamieson Response to CEC IR 1 – CSTS'. It appears unwise to increase the prevalence of a potential risk factor that may increase likelihood of autism in the children of older mothers.

References

[For consistency details are provided of studies mentioned. It is not intended for new references to be submitted as evidence].

Human Resources and Skills Development Canada (2013), Indicators of Well-being in Canada: Family Life - Age of Mother at Childbirth, http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=75

Sandin, S., Hultman, C.M., Kolevzon, A., Gross, R., MacCabe, J.H., Reichenberg, A. (2012), Advancing Maternal Age Is Associated With Increasing Risk for Autism: A Review and Meta-Analysis. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(5), 477-486.e1 (Abstract).