References of over 200 scientific studies and six (6) reviews reporting potential harm at non-thermal (not heating) levels of radiofrequency/microwave radiation that are below Safety Code 6 (2015)

Canadians for Safe Technology (C4ST)

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Objective: To compile a list of studies from three recent Canadians for Safe Technology (C4ST) reports that demonstrate potential harm at non-heating (non-thermal or athermal) levels of radiofrequency/microwave radiation[1] and at or below Safety Code 6 (2015) levels.

Methods: The following C4ST reports were examined for relevant studies:

1) *References and extracts of over 60 scientific studies published in 2015 and up to April 2016 reporting potential harm at or below Safety Code 6 (2015), Health Canada's guidelines for safe human exposure to radiofrequency/microwave radiation* (April, 2016)
2) *Wi-Fi in Schools - A Health and Safety Issue* (November 2015)
3) *Submission to Honourable Rona Ambrose, Minister of Health. Re: Health Canada consultation on proposed revisions to Safety Code 6. Title: Relevant Scientific Studies (140) Omitted by Health Canada in its Scientific Review of Draft Safety Code 6 (2014), Canada's Safety Guidelines for Safe Exposure to Radiofrequency/Microwave Radiation* (July 2014)

References in the original reports were identified from searches in PubMed[2] and EMF portal[3] and from references included in those reports. The abstracts, and when necessary the full studies, were examined to determine whether the exposure levels were below Safety Code 6 and were non-heating (non-thermal). Duplicate studies were removed. The six (6) systematic reviews were identified from PubMed and referrals from colleagues.

Results: A total of over 200 studies were identified (Table 1).

The six systematic reviews examined sperm quality, male reproduction, risk for tumors in humans, and oxidative stress (Table 2).

Results for studies that provided Specific Absorption (SAR) values from each of the three reports are summarized in Figures 1, 2 and 3.

Tables and Figures: Page

[1] Common sources would be cell phones, smart phones, Smart meters (automated metering infrastructure), baby monitors.
[2] US National Library of Medicine National Institutes of Health website: http://www.ncbi.nlm.nih.gov/pubmed
[3] EMF Portal website: http://www.emf-portal.de/suche.php?l=e

Table 1. List of over 200 references from reports[5] prepared by Canadians for Safe Technology (C4ST) documenting potential harm at non-heating (non-thermal) levels (below Safety Code 6 (2015)).

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[5] 1) References and extracts of over 60 scientific studies published in 2015 and up to April 2016 reporting potential harm at or below Safety Code 6 (2015), Health Canada's guidelines for safe human exposure to radiofrequency/microwave radiation (April, 2016)

2) Wi-Fi in Schools - A Health and Safety Issue (November 2015)

3) Submission to Honourable Rona Ambrose, Minister of Health. Re: Health Canada consultation on proposed revisions to Safety Code 6. Title: Relevant Scientific Studies (140) Omitted by Health Canada in its Scientific Review of Draft Safety Code 6 (2014), Canada's Safety Guidelines for Safe Exposure to Radiofrequency/Microwave Radiation (July 2014)

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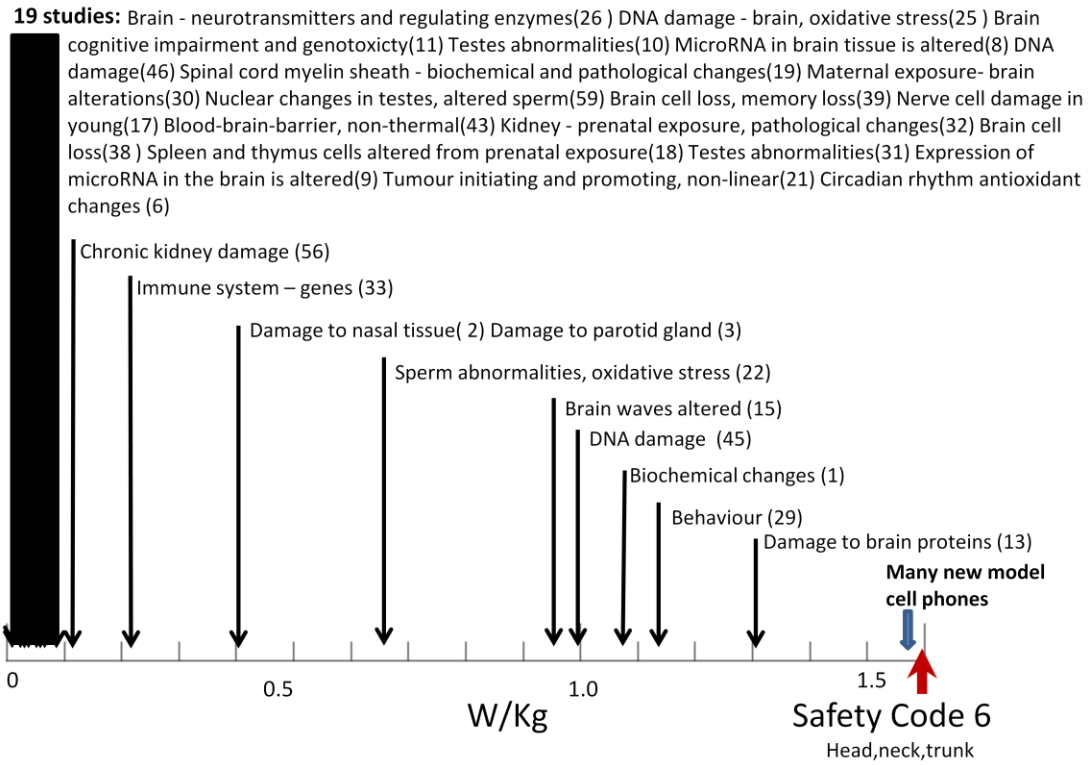

Figure 1. Summary of thirty (30) relevant scientific studies published in 2015 and up to April 2016 reporting potential harm at or below Safety Code 6 (2015). Specific Absorption Rate (SAR) for head, neck and trunk is 1.6 W/Kg. Human, animal and cell culture studies. For details of the study by number see: http://momswhocare.ca/wp-content/uploads/2016/07/Over-60-pdf-studies-2016-showing-harm-below-Safety-Code-6-18April-2016.pdf

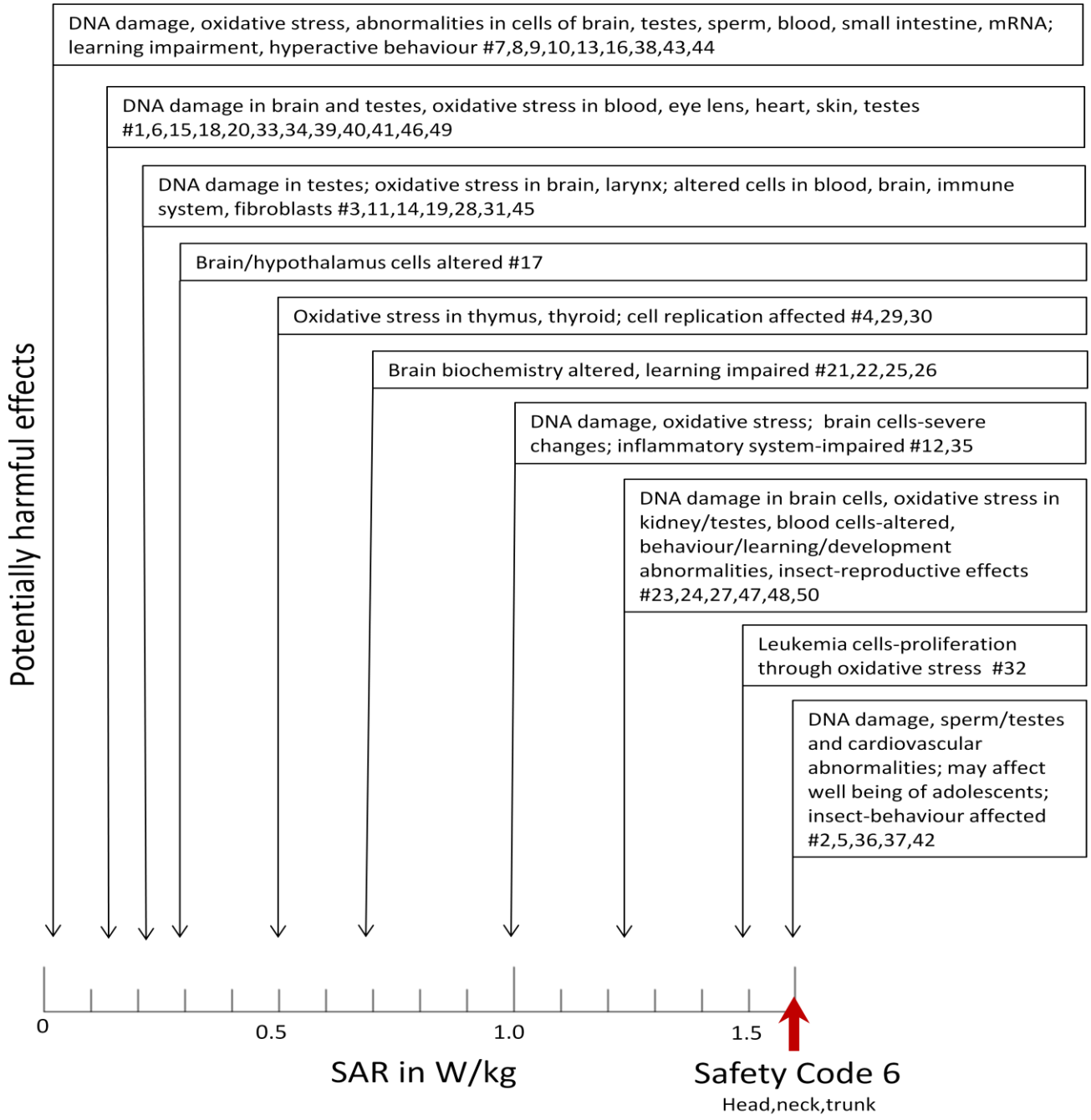

Figure 2. Summary of 50 studies reporting potential harm at or below Safety Code 6 (2015) levels for exposures at Wi-Fi (2.45 GHz) radiofrequency and the Specific Absorption Rate (SAR) reported for each study. Human, animal and cell culture studies. Health Canada's Safety Code 6 SAR level is 1.6 W/kg (head, neck and trunk).

For details of the study by number see:
http://archives.c4st.org/WiFiCanadianSchools?highlight=WzUwLCJzdHVkaWVzIl0

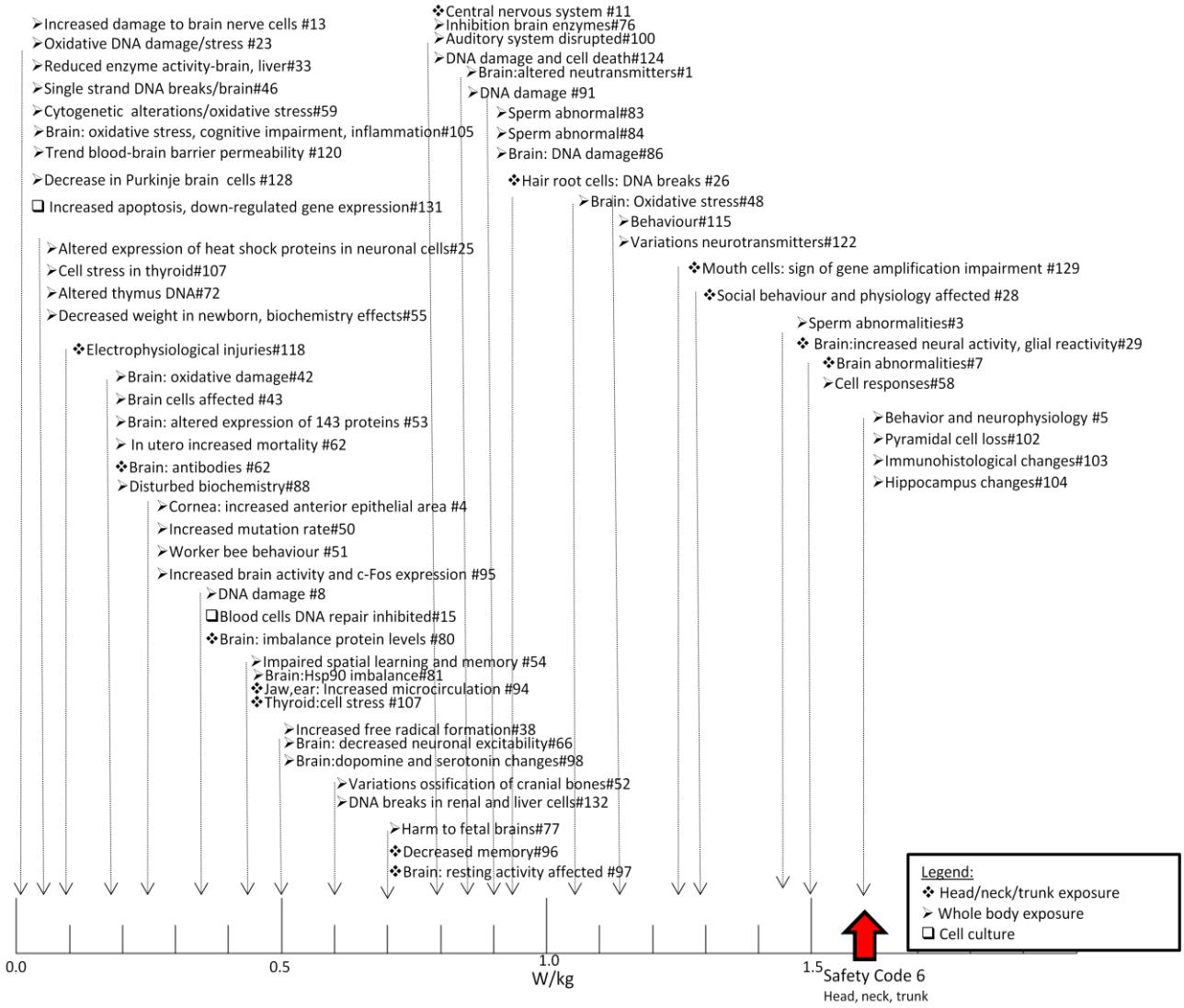

Figure 3. Summary of potentially harmful effects in the C4ST "140 omitted studies" report submitted to Health Canada, 15 July 2014. None are in Safety Code 6 Rationale (2015) nor in the Royal Society of Canada's Expert Panel report (2014) nor in any of their "Authoritative Reviews". All studies are in the radio/microwave frequency range. Specific Absorption Rate (SAR) levels were taken from the original papers and from EMF Portal http://www.emf-portal.de/

 # indicates the number of the reference in the report: Relevant Scientific Studies (140) Omitted by Health Canada in its Scientific Review of Draft Safety Code 6 (2014), Canada's Safety Guidelines for Safe Exposure to Radiofrequency/Microwave Radiation (July 2014). See: http://archives.c4st.org/website-pages/c4st-reviews-ignored-studies.html?highlight=WzE0MCwic3R1ZGllcyIsImlnbm9yZWQiLCIxNDAgc3R1ZGllcyIsIjE0MCBzdHVkaWVzIGlnbm9yZWQiLCJzdHVkaWVzIGlnbm9yZWQiXQ

Table 2. Titles and extracts from six systematic reviews addressing effects on sperm, male reproduction, tumors and oxidative stress from exposure to radiofrequency/microwave radiation at non-heating levels (non-thermal) levels.

1. Adams, J. A., Galloway, T. S., Mondal, D., Esteves, S. C., & Mathews, F. (2014). Effect of mobile telephones on sperm quality: A systematic review and meta-analysis. *Environment International*, *70*, 106–112

Extract: "... A systematic review... followed by meta-analysis... to determine whether exposure to RF-EMR emitted from mobile phones affects human sperm quality... We used ten studies in the meta-analysis, including 1492 samples. Exposure to mobile phones was associated with reduced sperm motility (mean difference − 8.1% (95% CI − 13.1, − 3.2)) and viability (mean difference − 9.1% (95% CI − 18.4, 0.2))... The results were consistent across experimental in vitro and observational in vivo studies. We conclude that pooled results from in vitro and in vivo studies suggest that mobile phone exposure negatively affects sperm quality..."

2. Bortkiewicz, A., Gadzicka, E., & Szymczak, W. (2017). Mobile phone use and risk for intracranial tumors and salivary gland tumors – A meta-analysis. *International Journal of Occupational Medicine and Environmental Health.* *doi:10.13075/ijomeh.1896.00802*

Extract: "...Twenty four studies (26 846 cases, 50 013 controls) were included into the meta-analysis. A significantly higher risk of an intracranial tumor (all types) was noted for the period of mobile phone use over 10 years (odds ratio (OR) = 1.324, 95% confidence interval (CI): 1.028-1.704), and for the ipsilateral location (OR = 1.249, 95% CI: 1.022-1.526). The results support the hypothesis that long-term use of mobile phone increases risk of intracranial tumors, especially in the case of ipsilateral exposure..."

3. La Vignera, S., Condorelli, R. A., Vicari, E., D'Agata, R., & Calogero, A. E. (2012). Effects of the Exposure to Mobile Phones on Male Reproduction: A Review of the Literature. *Journal of Andrology*, *33*(3), 350–356.

Extract: "... The aim of this article was to review the existing literature exploring the effects of RF-EMR on the male reproductive function in experimental animals and humans...in rats, mice, and rabbits ... RF-EMR decreases sperm count and motility and increases oxidative stress... men using mobile phones have decreased sperm concentration, decreased motility (particularly rapid progressive motility), normal morphology, and decreased viability. These abnormalities seem to be directly related to the duration of mobile phone use."

4. Myung, S.-K., Ju, W., McDonnell, D. D., Lee, Y. J., Kazinets, G., Cheng, C.-T., & Moskowitz, J. M. (2009). Mobile phone use and risk of tumors: a meta-analysis. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*, *27*(33), 5565–5572

Extract: "....RESULTS: Of 465 articles meeting our initial criteria, 23 case-control studies, which involved 37,916 participants (12,344 patient cases and 25,572 controls), were included in the final analyses... "

5. Prasad, M., Kathuria, P., Nair, P., Kumar, A., & Prasad, K. (2017). Mobile phone use and risk of brain tumours: a systematic review of association between study quality, source of funding, and research outcomes. ***Neurological Sciences: Official Journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology*** doi:**10.1007/s10072-017-2850-8**

Extract: " ... Twenty-two case control studies were included for systematic review. Meta-analysis of 14 case-control studies... for mobile phone use of 10 years or longer (or >1640 h), the overall result of the meta-analysis showed a significant 1.33 times increase in risk... Studies with higher quality showed a trend towards high risk of brain tumour, while lower quality showed a trend towards lower risk/protection."

6. Yakymenko, I., Tsybulin, O., Sidorik, E., Henshel, D., Kyrylenko, O., & Kyrylenko, S. (2016). Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. ***Electromagnetic Biology and Medicine*****,** ***35*****(2), 186–202**

Extract: "... among 100 currently available peer-reviewed studies dealing with oxidative effects of low-intensity RFR, in general, 93 confirmed that RFR induces oxidative effects in biological systems. ... oxidative stress induced by RFR exposure should be recognized as one of the primary mechanisms of the biological activity of this kind of radiation."