Questions to ask OHA

- **Does OHA have a scientifically substantiated opinion on the issue of whether wireless is safe for children?** If so what studies were reviewed as the OHA report does not show a review of studies on children's vulnerability nor on nervous system impacts. OHA only focuses on haphazardly selected studies- primarily human cancer research. Did OHA review the science on nervous system impacts, oxidative stress and reproductive impacts?
- **Why didn't OHA review the research on children's vulnerability?**
- What scientific review substantiates the new policy statement in a document titled "OHA STATEMENT" that was formally released at a public meeting this August, both the Oregon Health Authority and the Oregon Health Policy Board, declared that, "While the available data do not prove a causal effect [of harm], neither do they exclude the possibility of a causal effect."
- Wy did OHA not use as a search term "radiofrequency"- the name of the type of electromagnetic field wireless radiation is? EHT has criticised the review for omitting lots of research due to the flawed search terms.
- Why is OHA not fixing the errors? **The OHA inaccurately defined the RFR frequency range and misrepresents several studies as detailed in EHTs critique.**
- **Why does OHA say there was no effect in reproduction when there were only *four studies* listed in the OHA review tables regarding impacts to reproductive organs (not including pregnancy- which OHA got wrong as they had the wrong type of EMF) .** The studies listed in the table are Wdowia k et al. (2007) (185), Agarwal et al. (2008)(95) Ahlbom et al. (2004) and Al- Quzwiniet al. (2016). **How can a conclusion be based on four publications?**

Numerous published studies on reproductive effects were omitted.

Numerous published studies on reproductive effects were omitted from the OHA review. After all, the OHA review only lists 4 or 5 if you count the missing citation and as the reviews below confirm, there are numerous other studies in the peer reviewed literature. This omission likely was due to the inadequate search terms although there is no way to know what occurred in the OHA process because OHA did not list studies they rejected after reading the full article.

OHAs conclusions on reproductive effects (from just 4 publications?) are not in line with published reviews on effects to reproduction.

The following scientific reviews on impacts to reproduction came to more detailed and very different conclusions than OHA. *None were included in the OHA review.*

- Negi and Singh 2020 states in their review, " Cell phone radiation harms male fertility by affecting the different parameters like sperm motility, sperm count, sperm morphology, semen concentration, morphometric abnormalities, increased oxidative stress along with some hormonal changes."
- Kesari et al. 2018 states, "From currently available studies it is clear that radiofrequency electromagnetic fields (RF-EMF) have deleterious effects on sperm parameters (like sperm count, morphology, motility), affects the role of kinases in cellular metabolism and the endocrine system, and produces genotoxicity, genomic instability and oxidative stress."
- Singh et al., 2018 states, "available data indicate that exposure to EMF can cause adverse health effects...Persistent exposures of EMF radiation can result in health hazards because these radiations interfere with normal physiological and biological function of the body. EMF works as an environmental pollutant and has undesirable health effects on animals and humans."
- Houston et al., 2016 states "Among a total of 27 studies investigating the effects of RF-EMR on the male reproductive system, negative consequences of exposure were reported in 21.

Within these 21 studies, 11 of the 15 that investigated sperm motility reported significant declines, 7 of 7 that measured the production of reactive oxygen species documented elevated levels and 4 of 5 studies that probed for DNA damage highlighted increased damage, due to RF-EMR exposure."

- Sepehrimanesh and Davis 2016 states, "This paper reviews proteomic experimental and clinical evidence that EMF acts as a male-mediated teratogen and contributor to infertility."
- Adams et al., 2014 states "Our analyses indicate negative associations between mobile phone exposure on sperm viability and motility."

Below is the table from a 2021 published review Negi and Singh 2020 . Although almost all the studies reviewed by Negi and Singh 2020 are in the time frame of the OHA review, only the Agarwal studies are included in the OHA report due to the OHA's unusual scope.

Table 1. Summary of the major parameter of male infertility affected due to exposure.

S.No	Cell type	Source	Radiation exposure	Outcome	References
1.	Testicular cells	Rat	4 G Smartphone RF-EMR exposure at a different time, duration	Impaired testes and upregulates testicular gene Spock3, the establishment of sperm quality and testicular injury by inhibiting overexpression Spock3	Gang Yu et al. (2020)
2.	Testicular cells	Balb/c mice	2.4 GHz, SAR of 30 and 92 mW/kg	Sperm concentration (at a low power density of Wi-Fi radiation) significantly increased	Delavarifar S et al (2020)
3.	Spermatozoa	Mouse	905 MHz, SAR of 2.2 W/kg	Increased mitochondrial generation of ROS and DNA oxidation	Brendan et al (2019)
4.	Testicular cells	Male mice	905 MHz, SAR of 2.2 W/kg	Mitochondrial generation of ROS increased with elevated DNA oxidation	Houston et al. (2019)
5.	Testicular cells	Wistar rats	A dual-band (900 MHz,1800 MHz), SAR of 1.6 W/kg	Nonsignificant decrease in serum testosterone levels.	Okechukwu (2019)
6.	Germ cells	Swiss albino mice	(902.4 MHz and 0.250 W power), SAR of 0.0516 and 0.0054 W/kg	Cellular antioxidant (GSH) levels and anti-oxidative enzyme (SOD) activity shows a significant decrease	Pandey and Giri (2018)
7.	Leydig cells	Mouse	1950 MHz, 3 W/kg	Cell proliferation decreased, cell cycle distribution, Testosterone secretion capacity, and P450scc mRNA level reduced.	Yan-Yun Lin et al. (2017)
8.	Seminal fluid	Human	GSM1800/1900 MHz	Prolonged cell phone daily usage shows a decrease in motility ratio and progressive motility percentage	Hagras et al. (2016)
9.	Spermatozoa	Rat	900 MHz, 0.66 ± 0.01 W/kg	Increases the ROS level and decreases TAC in sperm	Qi Liu et al (2015)
10.	Testicular cells	Rat	900 MHz	Sperm parameters decrease, irregular seminiferous tubules, giant multinucleated cells, and the number of Leydig cells reduced	Bin-Meferij et al (2015)
11.	Seminal fluid	Rat	2.45 GHz, 0.018 W/kg	Significant decrease in sperm count and sperm viability, Reduction in testicular 3β HSD activity and plasma testosterone levels	S.Shahin et al. (2014)
12.	Seminal fluid	Human	Based on the active usage of mobile phone	Sperm DNA fragmentation changed who use the mobile phone for more than 4 h/d	Rago R et al (2013)
13.	Testicular cells	Rat	2.45 GHz, SAR of 0.14 W/kg	Facilitate DNA Damage in testicular cells	Meena et.al (2013)
14.	Plasma Testosterone	Male Sprague Dawley rats	1800-MHz, SAR of 0.5762 W/kg	Regulation of testosterone affected	Qin F et al (2012)
15.	Spermatozoa	Human	900-MHz, SAR 2.0 W/kg	A significant effect on sperm morphometry, decrease in sperm binding to the Hemi zona	Falzone et al. (2011)
16.	Spermatozoa	Male Wistar rats	Mobile phone exposure, SAR of 0.9 W/kg	A decrease in sperm count and apoptosis increased	Kesari et al. (2010)
17.	Seminal fluid	Human	850 MHz, SAR of 1.46 W/kg	Motility and viability significantly reduced, Increased in ROS level while decreased in ROS-TAC score	Agarwal et al. (2009)
18.	Spermatozoa	Human	1.8 GHz, SAR from 0.4 to 27.5 W/kg	Decrease in sperm Motility and vitality while significantly increased in Mitochondrial ROS	De Iuliis et al. (2009)
19.	Spermatozoa	Human	900 MHz GSM, SAR of 2.0 and 5.7 W/kg	Significant decrease in Mitochondrial membrane potential, no effect on motility	Falzone et al. (2008)
20.	Seminal fluid	Human	Based on the mobile phone usage duration	Semen quality decreased, declining the sperm count, motility, viability	Agarwal et al. (2008)

It is notable that *after the publication of the OHA Report*, newly published reviews confirm that non ionizing radio frequency EMFs have been found to harm reproductive organs. For example the study "Current progress on the effect of mobile phone radiation on sperm quality: an updated systematic review and meta-analysis of human and animal studies" published in Environmental Pollution concludes that "Mobile phone RF-EMR

directly impaired mature sperm of men in vitro." and "Mobile phone RF-EMR affected some parameters of sperm quality in experiment animals."

Regarding the errors in the OHA report- Why did OHA define radiofrequency radiation of cell phones and Wi-Fi, or approximately between 1.6 gigahertz (GHz) and 30 GHz when wireless devices use frequencies much lower than 1.6 GHz? The WHO/IARC defines RFR for their investigation of carcinogenicity as the frequencies of 30 kHz to 300 GHz and many studies have investigated. Why did OHA include research on EMF frequencies that are not radiofrequency?

See my notes in dark blue

Questions for OHA Re: SB 283 Report on RFR in Schools

1. Why were animal studies excluded from the literature review? Don't they have an important role to play in assessing risk?
2. Why did OHA exclude consideration of the $30-million, 10-year, U.S. government study conducted by the National Toxicology Program that found "clear evidence" of cancer. The federal government described it as "the most comprehensive assessment, to date, of health effects in animals exposed to RFR."

   This is in response to both questions 1 and 2:

   a. To clarify, SB 283 required OHA to conduct a literature review which does not entail a hazard evaluation or risk assessment. A risk assessment is a much more involved process that estimates the nature and probability of adverse health effects in humans who may be exposed to chemicals (or other stressors) in the environment, presently or in the future. A literature review synthesizes scholarly literature on a topic by evaluating a selection of sources. It describes common themes, but also demonstrates the authors' understanding of the literature through critical analysis, as well as identifying gaps, biases or controversies in the research.

   Environmental Health Trust: This literature review did not identify gaps nor research needs in the area. Further if it is not a hazard evaluation or risk assessment as OHA states here, it cannot make a conclusion on risk or harm especially as it lacks animal data. It is just a review of haphazardly collectd studies and would never pass peer review as it got numerous facts wrong and numerous studies were omitted.

   See scientific Letters Sent to the Oregon Health Authority

   b. Letter From US, International and Environmental Health Trust Experts
   c. Letter from Physicians for Safe Technology
   d. Letter From Environmental Working Group to the Oregon Health Authority

   e. Animal studies can play an important role in the hazard evaluation and risk assessment of environmental exposures. However, for this literature review OHA prioritized the review of the numerous available human (epidemiological) studies as the most relevant for school settings OHA utilized limited existing resources to complete a review of the observational studies on humans.

Environmental Health Trust: The OHA did not understand the issue enough to even include studies that pertain to school exposures, not did it characterize school exposures via presentations on studies that have been done or via a simple investigation of what sources are in schools.

f. OHA focused on human (epidemiology) studies and included over 200 epidemiology studies in its report. An extensive review of studies examining cancer related endpoints in animal studies has been conducted by the US Food and Drug Administration.
g. OHA later included a summary of conclusions from the National Institutes of Health's National Toxicology Program (NTP) animal study in its FAQs here: https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RADIATIONPROTECTION/Documents/SB_283_FAQ.pdf. In sum:
    i. NTP assessed the health effects of exposure to RFR in rats (male and female) and mice (male and female). The lowest exposure level for rats (1.5 W/kg) was similar to the maximum allowed for humans (1.6 W/kg) by the Federal Communications Commission. The lowest exposure level for mice was 2.5 W/kg.
    ii. The animals were exposed for a total of 9 hours and 10 minutes a day (in 10 minutes on, 10 minutes off cycles during a period of 18 hours and 20 minutes each day) for up to a period of two years (most of the life of rats and mice). The exposure was to the whole body. The animals were examined for tumor formation and other toxicity endpoints.
    iii. NTP concluded that there was clear evidence of RFR association with tumors in the hearts of male rats and some evidence of RFR association with brain and adrenal gland tumors, also in male rats. However, NTP did not find clear evidence in female rats, male mice, and female mice in the study. NTP also found that the exposed male rats at every exposure level lived longer than control rats, possibly due to a decrease in chronic kidney problems.

EHT: OHA forgot to menton they did find DNA damage. See these published response to such unfounded criticisms. "Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects" in Environmental Research, debunking widely circulated criticisms of the NTP study. (PDF from FCC) and "ICNIRP'S Evaluation of the National Toxicology Program's Carcinogenicity Studies on Radiofrequency Electromagnetic Fields" published in Health Physics debunking ICNIRPs conclusions.

    iv. There was also no RFR-related exposure-dependent effects on reproductive parameters examined in this study in mice and rats.
    v. The NTP stated that the findings in this study cannot be directly applied to humans because the exposure levels and durations were greater than what people may receive from cellphones.

Environmental Health Trust: A quantitative risk analysis needs to be done to take the animal data and understand the implications for humans. A peer-reviewed study by the Environmental Working Group looking at the NTP data recommends stringent health-based exposure standards - 200 to 400 times lower than the whole-body exposure limit set by the FCC in 1996.

The study, published in the journal Environmental Health, relies on the methodology developed by the Environmental Protection Agency to assess human health risks arising from toxic chemical

exposures. EWG scientists have applied the same methods to radiofrequency radiation from wireless devices, including cellphones and tablets. Read the press release.

vi. **In their report presenting the genotoxic effects from the NTP study, agency authors (Smith-Roe et al., 2019)[1] find that it is premature to draw solid conclusions based on existing epidemiology studies that found associations between cell phone use (and potentially RFR) and certain brain cancers. They stated that,**

> *"Concern exists as to whether cell phone RFR frequencies are capable of adversely affecting human health. Although some epidemiological studies suggest that cell phone use might increase the risk for certain brain cancers, such as gliomas and acoustic neuromas (a,k,a, vestibular schwannomas), the odds ratios for these increased risks are quite low (INTERPHONE Study Group 2010; Cardis et al. 2011; Hardell et al. 2011; Larjavaara et al. 2011; Sato et al. 2011; Hardell and Carlberg 2015). Conclusions drawn from these observations may be premature, as cell phone use has become commonplace only within the past two decades, a period of time that may be insufficient to accurately assess cancer-related outcomes."*

Environmental Health Trust: This is a quote from the beginning of the paper - the introduction- and it refers to the epidemiological studies *NOT the NTP animal study findings*. It was written to explain why the NTP did the genotoxicity tests and OHA should not use the quote to opine on the NTP conclusions. . Smith-Roe et al., 2019 found DNA damage after 14 to 19 weeks of exposure in the animals. OHA is misusing this paragraph and not putting it in the proper context. **Further, OHA should list the NTP DNA findings on its factsheet-** **.**(https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RADIATIONPROTECTION/Documents/SB_283_FAQ.pdf.) "***Results of the comet assay showed significant increases in DNA damage in the frontal cortex of male mice (both modulations), leukocytes of female mice (CDMA only), and hippocampus of male rats (CDMA only)…In conclusion, these results suggest that exposure to RFR is associated with an increase in DNA damage"***

> **In relation to previous studies on the topic, and as an example for why scientists need to consider the totality of the science before making hard claims for public health action, the authors state that,**
>
> *"Results of previous rodent cancer studies conducted with a variety of RFR exposures and durations are inconsistent and inconclusive, and many of these studies used experimental protocols with important limitations, indicating a need for a more definitive study (IARC Working Group on the Evaluation of Carcinogenic Risks to Humans 2013). Additionally, extensive reviews of the literature on the genotoxicity of various frequencies and modulations of RFR have concluded that evidence for RFR-associated genotoxicity is inconsistent and weak (Brusick et al. 1998; Ruediger 2009; Verschaeve et al. 2010), and some key studies reporting RFR-associated genotoxicity in human cell lines could not be replicated (Speit et al. 2013)."*

[1] https://onlinelibrary.wiley.com/doi/full/10.1002/em.22343

Environmental Health Trust: The OHA again seems to be throwing up a smoke screen by again quitting parts of the introduction. Yes "**scientists need to consider the totality of the science" (as OHA states here) and that is why the OHA Literature review is a failure of public health. It does not look at the totality of the science and yet puts forward a conclusion.**

vii. Extrapolating from animal health effects to human health effects can be quite complex, particularly for radiation. OHA looks to the FDA and NIH (NTP) to determine the implications of the findings of this NTP study for humans. Even if a determination for an environmental agent is made as carcinogenic, the risk would need to be put in perspective. We are exposed daily to environmental agents and adopt lifestyle practices that have the potential to cause both cancer and noncancer health effects; however, the exposure level, frequency, and duration are key to estimating those risks when they exist.

viii. The OHA SB 283 report did not include a limitations section, including the lack of an animal study review. However, OHA later included a summary of the NTP study in its FAQs with links to NTP materials. Inclusion of this study would not have changed OHA's overall conclusion.

Environmental Health Trust: OHA must include a limitations section if it is going to only put forward a small group of studies. This is best practice in science. OHA cannot opine on the safety issue if it has not properly reviewed the issue.

3. The article in the *Washington Spectator* alleges that Dr. Ali Hamade, the report's lead author, deleted pages of evidence found by the report's initial authors (interns from OSU) of wireless radiation's link to increased risk of harm? If true, why was this done?

a. OHA staff examined reports and scientific analyses of reports with an aim to distinguish association from causation. This was the purpose of the edits that staff made to initial drafts. For example, if a study found that increasing time spent on a wireless gadget screen is associated with sleep problems or behavioral changes, this does not necessarily mean that the sleep problems or behavioral changes were due to radiation exposure. There are many other factors that could be behind this association including, but not limited to, the content viewed on the gadget and the possibility that someone's mental state or mood made them more likely than others to spend time on a gadget such as phone or tablet. There are many such studies in the literature. Similarly, most studies do not account for co-occurring environmental exposures or lifestyle habits that might have the effect the study is examining. Lacking those measurements or considerations makes the outcomes less certain, even if they stimulate further thinking and study design.

EHT

OHAs response is a general one and such criticisms should be specific to each study. In health care, detailed methodologies with descriptions of strengths and discussions of nuances of scientific review steps have been developed by the International Cochrane Collaboration, and the US Agency for Health Research Quality (AHRQ), using methods that are summarized on the Preferred Reporting Items for Systematic Reviews and meta-Analyses (PRISMA) website (Moher et al, 2009, Liberati et al., 2009).

Good practice recommendations for systematic review for environmental health exposures have been developed and published (Whaley et al., 2016, Whaley et al., 2020, Rooney et al., 2014, NAS, 2017, Stephens et al., 2016). OHA did not grade or weigh the evidence, rate the level of confidence or translate that level into levels of evidence for health effects- not with any of the studies- those that were deleted and those that remained.

b. All authors contributing to the report indicated their approval of edits in the final drafts of the report. The changes noted are part of routine document editing. The purpose of a student internship is to gain experience in critically evaluating and synthesizing information on a topic. This report was part of that experience and edits made were crucial for both accuracy and to provide a fruitful learning experience.

Environmental Health Trust: This response is filled with unsubstantiated conclusions with no science base as any statements like *"most studies do not account for co-occurring environmental exposures or lifestyle habits that might have the effect the study is examining"* require a link to the actual study with data to back it up. The OHA report had numerous inaccuracies that require correction.

- **The OHA inaccurately defined the RFR frequency range.** OHA Report page 30 states, "OHA identified relevant RFR emissions to be in the frequency range of cell phones and Wi-Fi, or approximately between 1.6 gigahertz (GHz) and 30 GHz." This is inaccurate. The WHO/IARC defines RFR for their investigation of carcinogenicity as the frequencies of 30 kHz to 300 GHz. How did OHA come up with the range of 1.6 GHz to 30 GHz.
  It is hard to have confidence in a study that misidentifies the basic parameter under investigation (albeit lower frequencies are noted among results and the report discussion).
- The OHA report inaccurately criticized Foerster et al., 2018 study stating that, "there were very large differences between reported phone use and phone use records." Such a statement should have been immediately followed by the clarification that data records of quantitative phone use was then obtained from the mobile phone operators themselves and these subjects were part of what was termed the operator data sample. Changes in figural memory score were negatively correlated with cordless phone calls and, in tendency, with the duration of mobile phone calls and the cumulative RF-EMF brain dose. Thus OHA did not accurately present this study as the association with RF-EMF brain dose was significant in the operator data sample.
- Momoli et al. (OHA citation 51) - Although the paper found a doubling of glioma with exposure, the OHA report only said *"Little evidence of an increase in the risk of meningioma, acoustic neuroma, or parotid gland tumors in relation to mobile phone use. Strong study - Re-analysis of INTERPHONE study results with correction for selection, recall bias, but not sampling bias. Interviewer bias is possible due to non-blinded interviews."*

4. Please comment on the allegation that it was the deletion of the following two findings from the first draft that allowed the report to conclude that there was not significant risk from RFR in schools:
   - "*All the studies that investigated the outcomes of general health and symptoms of ill health found that EMF exposure negatively impacted health.*"
   - *"All studies that investigated the reproductive system found a negative association with EMF exposure."*

Please refer to the answer to question 3. The purpose of multiple layers of review within OHA is to ensure that the report provides an objective assessment of the science. Any changes made to statements by the reviewers was to best represent the totality of the evidence.

Environmental Health Trust: This is an unacceptable answer because 1. It was not a report on the "totality" of the science and 2. numerous studies showed harm that were omitted from this review. The OHA did not use methodology considered standard best practice in science. This could not have had multilayered review as it has far to many errors.

5. Why was the first draft withheld from a formal public records request for all drafts of the report?

   The initial request specified "*ALL draft versions of the Oregon Health Authority's report, 'Wireless Technology Health Risks' that were distributed for review prior to its publication on Dec 31, 2020. Date range: Sept 2019 - Dec 2020.*" The draft versions that were released to the requester were the drafts that were distributed by the authors to the reviewers. The subsequent request (a few months later) was for all drafts. At that time, OHA released the drafts provided to the original request in addition to other (previous) drafts. OHA has met all its obligation under the public records requests.

Environmental Health Trust: The first draft was "distributed for review" and it was withheld. The request did not specify which type of review but simply "ALL draft versions for review." The interns sent it for review. OHA states in this document in section 3. that *"All authors contributing to the report indicated their approval of edits in the final drafts of the report. The changes noted are part of routine document editing."* **The full request was "I would like to receive a copy of ALL draft versions of the Oregon Health Authority's report, "Wireless Technology Health Risks" that were prepared and distributed for review prior to its publication on Dec 31, 2020. Date range: Sept 2019 - Dec 2020."**

6. Bandara and Carpenter's 2018 analysis of 2,266 studies found that 68 percent "demonstrated significant biological or health effects associated with exposure to anthropogenic electromagnetic fields." Similarly, of the 166 scientific articles (out of 218 total) where the OHA risk report makes a Yes/No determination as to whether the paper in question found a link to an adverse health effect, a majority were in the affirmative (84 Yes and 82 No). Why did that not trigger a more affirmative conclusion in the report?

   a. Bandara and Carpenter (2018) is an opinion piece that did not analyze the 2,266 studies. Bandara and Carpenter referenced a paper that seems to have reviewed fewer studies on the oxidative stress effects of electromagnetic radiation, although the 2,266 studies might have been reviewed in a separate effort by the authors and filed in a database. It is not clear if that effort was peer reviewed.

EHT: All of the referenced papers were peer reviewed. What does OHA even mean by "Bandara and Carpenter referenced a paper that seems to have reviewed fewer studies on the oxidative stress effects of electromagnetic radiation"

   b. OHA's Yes determination was used if the study reported an association. It is not based on a causal effect. Association is only one factor in determining causation. One example of a Yes that does not help the weight of evidence is illustrated in the answer

to question 3 above. This is the case where screen time is associated with sleep or behavioral change, but not necessarily an electromagnetic field or RFR exposure. OHA looks forward to more studies on the topic and to more syntheses of the science by federal agencies.

EHT: Again OHA cannot have an opinion or determination when it has not even looked at all the science- as clearly shown by the studies included in the report.

c. In 2011, an International Agency for Research of Cancer (IARC) working group assessed the potential carcinogenic hazards associated with radiofrequency electromagnetic fields and labeled it as *possibly carcinogenic* to humans based on *limited evidence* among users of wireless telephones for glioma and acoustic neuroma. Dr. Jonathan Samet, chair of the working group, along with IARC staff, summarized the uncertainties associated with the relevant epidemiology studies[2] considered for the decision and indicated that these studies did not provide sufficient evidence to classify radiofrequency electromagnetic fields as *probably carcinogenic* to humans. OHA's review indicates that the uncertainties persist.

Environmental Health Trust: Again OHA is putting forward a conclusion, yet OHA has not reviewed the science to make such a determination. How can OHA assert "OHA's review indicates that the uncertainties persist" as they have not adequately looked at the totality of the science. In fact the IARC review stated that the lack of animal data was why the classification was not at probable carcinogen back in 2011. Now with the NTP and Ramazzini findings, there is important animal data which s why so many WHO advisors are saying the classification should increase.

d. OHA's review further point to the large cohorts from the United States and Nordic countries that did not show evidence of increased cancer incidence in association with the increase in cell phone use (also summarized in the OHA report.) Regardless, OHA looks to ongoing studies and subsequent syntheses of the science to help drive knowledge on this topic. Even if a determination for an environmental agent is made as carcinogenic, the risk would need to be put in perspective. We are exposed daily to environmental agents and adopt lifestyles that have the potential to cause both cancer and noncancer health effects; however, the exposure level, frequency, and duration are key to estimating those risks when they exist.

EHT: Again this response lacks a science base. First the studies referenced have been so criticized the WHO will not use them- Danish cohort studies as they had contaminated control groups.
OHA references Poulsen et al. 2013 (OHA citation 27) FYI-Establishment of the original cohort was supported by grants from the 2 Danish operating companies (Tele Danmark Mobil and Sonofon)
The Danish cohort studies OHA reviewed (and cited above) were funded by industry - the design itself developed with industry funding and from that design came numerous publications. Furthermore, the IARC did not weigh the study findings heavily due to numerous fundamental flaws. IARC's Robert Bann wrote that the Danish cohort exclusion of the corporate subscribers "seems remarkable" and "could have resulted in considerable misclassification in exposure assessment."

Several experts wrote letter to the journal about the fundamental flaws in the danish cohort research:

- Philips A, and G. Lamburn. "Updated study contains poor science and should be disregarded." BMJ, vol. 343, 2011.

[2] https://journals.lww.com/epidem/Fulltext/2014/01000/Commentary__Mobile_Phones_and_Cancer__Next_Steps.7.aspx

- Ahlbom, Anders, et al. "Re: Cellular telephone use and cancer risk: update of a nationwide Danish cohort study." Journal of the National Cancer Institute, vol. 99, no. 8, 2007, pp. 655.
- Kundi, Michael. "Re: Cellular Telephone Use and Cancer Risk: Update of a Nationwide Danish Cohort." Journal of the National Cancer Institute, Letter to the Editor, 2006.
- Leszczynski, Dariusz. "Re: Use of mobile phones and risk of brain tumours: update of Danish cohort study." BMJ, vol. 343, 2011.
- Davis, Devra, Ronald Herberman and Yael Stein. "Re:Not enough data excluding cellphones' morbidity." Review of Use of mobile phones and risk of brain tumours: update of Danish cohort study, by Schuz, et al. BMJ, vol. 343, 2011.
- Henshaw, Denis. "Mobile phone radiation could be detected by the human brain." Review of Use of mobile phones and risk of brain tumours: update of Danish cohort study, by Frei, et al. BMJ, vol. 343, 2011.
- Khurana, Vini. "Danish cohort study: Questions regarding selection, exposure, and tumour incidence." Review of Use of mobile phones and risk of brain tumours: update of Danish cohort study, by Frei, et al. BMJ, vol. 343, 2011.
- Frey, Allan H. "On the Safety of Cell Phone Radiation." Review of Use of mobile phones and risk of brain tumours: update of Danish cohort study, by Frei, et al. BMJ, vol. 343, 2011.
- Morgan, Lloyd L. "The Danish Cellphone Subscriber Study on the Risk of Cancer Among Subscribers Is Fundamentally Flawed." Review of Use of mobile phones and risk of brain tumours: update of Danish cohort study by Frei, et al. BMJ, vol. 343, 2011.
- Reviews of "Use of mobile phones and risk of brain tumours: update of Danish cohort study" by Frei, et al. BMJ, vol. 343, 2011.

7. SB 283 required OHA to use "independently funded scientific studies" as the basis of its conclusions, but it in fact included studies with funding from industry (somewhere between six and an alleged 27).

   SB 283 did not define the term "independently funded scientific studies." The plain meaning of the term would mean research that is funded by the person/entity conducting the study and not by other parties. By that meaning a pharmaceutical company funding its own drug study would be considered independent while an academic researcher conducting a study funded by a non-profit advocacy organization would not be considered independent. From the legislative record it could be assumed the term to mean independent of telecom industry funding, however the meaning of the term is still ambiguous. As stated in the FAQs to SB283, OHA considered independently funded studies to include all epidemiology primary research. These studies were all conducted by scientists and underwent peer-review, regardless of funding source. When possible OHA indicated funding sources for the reviewed studies in an appendix to the report. For more information on who pays for science please see: https://undsci.berkeley.edu/article/who_pays.

For information on industry involvement into the science please read

- Wireless Hazards by Barbara Koepell in the Washington Spectator
- The Harvard Press Book by Norm Alster, "Captured Agency: How the Federal Communications Commission is Dominated by the Industries it Presumably Regulates"

- Investigate Europe's Three Part Investigation on 5G
    - "The ICNIRP Cartel: Who's Who in the EMF Research World
    - 5G The Mass Experiment (Part 1)
    - How Much is Safe? Finances Effect Research (Part 2)
    - Real 5G issues overshadowed by Covid-19 conspiracy theories (Part 3)
- A report released by European Members of Parliament "The International Commission on Non-Ionizing Radiation Protection: Conflicts of Interest, Corporate Capture and the Push for G." (PDF)
- "The Disinformation Campaign—And Massive Radiation Increase—Behind The 5G Rollout" by Mark Hertsgaard And Mark Dowie in The Nation April 23, 2018
- War on 5G: Amsterdam Investigation into Scientists Finds Telecom Influence by Jannes van Roermund and Paul Thacker, De Telegraaf (Amsterdam), Jun 2, 2020 (English translation) on the American Council on Science and Health attacks against Prof. Moskowitz and more.
- Is 5G Going to Kill Us, The New Republic by Christopher Ketcham
- Democracy Now: How the Wireless Industry Convinced the Public Cellphones Are Safe & Cherry-Picked Research on Risks
- Project Censored Investigations: How Big Wireless Convinced Us Cell Phones and Wi-Fi are Safe, "PhoneGate:" French Study Finds 9 of 10 Cell Phones Exceed Safe Radiation Limits.
- Seattle Magazine, "UW Scientist Henry Lai Makes Waves in the Cell Phone Industry." Seattle Magazine on Motorola working to create doubt and attack Dr. Lai's research finding DNA damage.
- The Lies Must Stop Disband ICNIRP: Facts Matter, Now More Than Ever by Louis Slesin in Microwave News. Apr 9, 2020.
- Will WHO Kick Its ICNIRP Habit? Non-Thermal Effects Hang in the Balance. Microwave News, Nov 4, 2019.
- We Have No Reason to Believe 5G is Safe. Scientific American, by Joel Moskowitz PhD
- There's a clear cell phone-cancer link, but FDA is downplaying it. The Hill, Ronald Melnick, Ph.D.

8. Dr. David Bangsberg, chair of the Oregon Health Policy Board, reviewed the report, consulted with OHA, and concluded the following: "While the available data do not prove a causal effect, neither do they exclude the possibility of a causal effect." Given that possibility, shouldn't the "precautionary principle" lead the Legislature to consider steps to reduce children's exposure to WiFi in a school setting? To what extent should the precautionary principle be driving public policy. What are the next steps that the OHA would recommend as a follow-up to the SB 283 study?
    a. The state of the science is inconclusive on the health effects of RFR to people from sources that could be present in a school setting. The above quoted statement simply means that OHA cannot say with a 100% certainty that no effects are possible. As OHA states in its report in fulfilment of SB 283 requirements, it looks forward to more research and literature synthesis on this topic.

EHT OHA cannot opine on the state of science as it has not shown a review of the full body of science.

b. OHA embraces the precautionary principle in its approach to environmental exposures and strives to ensure that there is an adequate margin of safety separating people from environmental exposures. The evidence for health effects from RFR exposures in a school setting is not yet available and therefore there is no benchmark from where to draw precaution.

EHT: Numerous medical groups recommend reducing RFR in schools. There is a benchmark . Read Study: Wireless radiation exposure for children should be hundreds of times lower than current federal limits
Physician groups such as the American Academy of Pediatrics, the Vienna Medical Association, and the Athens Medical Association are among the many international medical organizations that have issued recommendations to the public to reduce exposure to cell phone radiation.
Countries such as France, Cyprus, and Israel have banned wireless in young children's classrooms as their public health authorities recommend reducing children's exposure to RF.
In several letters sent to school districts, physicians strongly recommended wired connections for technology in classrooms to eliminate unnecessary wireless radiation exposures.

c. OHA looks to any new determinations from the US Food and Drug Administration, the National Institutes of Health, the Federal Communications Commission, and other agencies with appropriate expertise on this topic.

EHT: None of these agencies have investigated the issue of children and wireless radiation. That is why this OHA report is so important. It will ebe used as proof of safety. It must be retracted

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Re the precautionary principal- Why does OHA disagree with the authors of these studies?

- Kostoff et al., 2020 concludes "5G mobile networking technology will affect not only the skin and eyes, but will have adverse systemic effects as well."
- Russell, 2018 concludes that "a moratorium on the deployment of 5G is warranted" and "the addition of this added high frequency 5G radiation to an already complex mix of lower frequencies, will contribute to a negative public health outcome … from both physical and mental health perspectives"
- Di Ciaula 2018 concludes, "available findings seem sufficient to demonstrate the existence of biomedical effects, to invoke the precautionary principle."
- Yakymenko et al 2020 puts forward three mechanisms of harm from 5G including that the "absorption of 5G radiation in skin can lead to the generation of high levels of free radicals, which in turn increases the risk of skin cancer."
- Belyaev 2019 states, "the health effects of chronic MMW exposures may be more significant than for any other frequency range..It follows from available studies that MMW, under specific conditions of exposure at very low intensities below the ICNIRP guidelines, can affect biological systems and human health."
- Singh and Kappor 2014 conclude, "For the time being, the public should follow the precautionary principle and limit their exposure as much as possible."
- Sangun et al., 2015 reviewed effects to the endocrine system (an issue OHA omitted) and concluded that "Although the results are conflicting and cannot be totally matched with humans; there is growing evidence to distress us about the threats of EMF on children."

- Redmayne 2016 concludes "minimum exposure of children to RF-EMF is recommended."
- Moon 2020 a review on impacts to children states, "Precautionary approaches are recommended for children…"
- Miller et al., 2019 concludes, "current knowledge provides justification for governments, public health authorities, and physicians/allied health professionals to warn the population that having a cell phone next to the body is harmful, and to support measures to reduce all exposures to RFR."

Entire countries and cities worldwide, and many private schools in the US, are replacing Wi-Fi with corded connections.

- France has banned Wi-Fi in kindergarten and restricts Wi-Fi in school by having the wireless off as the default setting and teachers have wired (not wireless) computers for Internet access. In-school networks are being hardwired, and in situations where wireless is needed it is turned on only for a short duration in the classroom as needed and turned off after use. France also has banned cell phones in elementary/middle schools and started educating the public years ago with public health initiatives about how to reduce exposure.
- Israel has banned Wi-Fi in nursery schools, restricts Wi-Fi in elementary schools, bans cell phones in classrooms, has a national institution educating on how to reduce cell phone radiation, and has a limit of 4 mG for EMF.
- Cyprus has removed Wi-Fi from elementary classrooms and has a strong public awareness campaign educating parents, teenagers, and pregnant women.