

To: The Honorable Governor Brown
From: Dr. Cindy Russell
RE: SB649 SB 649 (Hueso) Wireless Telecommunications Facilities
Date September 19, 2017

Dear Honorable Governor Brown:

I am an MD and lifelong democrat who has followed your governorship in awe of your knowledge and thoughtfulness about the major environmental issues we face as humans. I respect your honesty and direct communications about trying to balance environmental and public health concerns with business interests so California can continue to be a powerful economic force. It is certainly not easy being a leader of this fine State, where I have lived most of my life, still appreciating the beauty and diversity we have here. My interest and perspective has always leaned towards public and environmental protection for my patient's health as well as sustainability of our fragile planet.

I am asking you to VETO SB649 as the full long term effects of this broad piece of legislation are not understood and have not been explored including concerns with

- Contribution to global climate change with increased energy use
- Mushrooming E-Waste
- Public health and public safety of increasing electrical grid input and 5G frequencies
- Environmental health
- Liability to cities for unforeseen damages
- Privacy
- Security of personal and medical data
- Loss of local governmental control.

Working through my local Santa Clara County Medical Association and the California Medical Association, I have for many years, put forth resolutions to reduce exposures to toxins, especially those we are exposed to on a regular basis. Learning the connection between environmental toxic exposures and chronic health conditions, has made many in health care realize how important preventative measures are for economic reasons as well as societal well-being. According to the CDC the annual health care expenditures for people with chronic and mental health conditions is \$2.3 trillion annually (113). A significant portion of this cost could be reduced by improving public and environmental health factors which cause or contribute to chronic diseases of our modern society.

Early exposures to seemingly small doses and mixtures of chemicals can hijack development of the reproductive, immune and neurologic systems. Similarly, we are finding that radiation from wireless technology we are increasingly exposed to is harmful to all biologic systems and thus acts as a toxic exposure to a wide variety of normal cellular processes. Studies show that microwave non-ionizing radiation from wireless devices is consistently associated with damage to sperm, brain cells, DNA, proteins and cell membranes and even plants and trees. (85-96) Despite industry claims, this non-ionizing radiation has been found to be harmful, even by government agencies such as NASA, Defense Intelligence Agency and the Naval Research

Institute. (105, 106, 107) Scientists who have performed research on this for decades would be happy to discuss this with you.

SB649, written by the telecommunications industry, aims to streamline placement of wireless antenna in cities and residential neighborhoods and is now before you. Please think carefully about what the bill promises to accomplish with regards to financial gains for the state and jobs, versus the long term health, privacy and democratic consequences of this bill that will carry into the future and become a burden to our children and their children. Retaining local authority is the basis of our democracy, and with this bill further erosion of communities will ensue. With purchases online now, local businesses are shutting down along with revenue to cities.

SB649 will worsen this financial situation as their revenue will not pace mandated but underfunded expenses. This is softened somewhat by legislation taxing online purchases but the evidence is already evident in our communities with more and more business closures.

Other issues regarding SB649 have not been addressed by California Legislators as this bill never reached any environmental or health committee during its review. Wireless devices and infrastructure have been assumed to be safe and environmentally neutral.

As more people are learning about his bill opposition has grown and now includes labor organizations and environmental groups such as the Sierra Club, Environmental Working Group and the Communication Workers of America. The environmental, human health and occupational hazards are now more apparent. Please consider the issues below in your deliberations.

1) Energy consumption:

A high Utility Bill contributing to global climate change will ensue as digital communications and the digital economy have a large carbon footprint. A significant increase in energy consumption will result from manufacturing, installing and maintaining the infrastructure of 5G for faster downloading of more data such as video streaming which consumes large amounts of energy. (13,14,15,16, 28, 29)

According to a report “The Cloud Begins with Coal”, the gains in improved energy efficiency of the devices is overshadowed by the energy costs of using the product more for heavy data transfer, manufacturing more products, replacing products when they become obsolete and to support Cloud infrastructure. (13)

Another report on energy use and devices indicates “**growing energy requirements for future computing needs will hit a wall in the next 24 years if the current trajectory is correct. At that point, the world will not produce enough energy for all of the devices that are expected to be drawing power.**” (29)

AB32, California’s landmark Global Warming Solutions Act of 2006 requires California to reduce its GHG emissions to 1990 levels by 2020 — a reduction of approximately 15 percent below emissions expected under a “business as usual” scenario. (68) The expected billions/trillions of global devices manufactured and connected to the Internet of Things would negatively contribute to California’s if not global energy reduction goals despite California’s advances in renewable energy. (69) Fiberoptic and wired connections are cheaper, more energy

efficient and more secure. That is what large medical systems use to keep patient data private. (28,29,30,31,32)

2) E-Waste Mushrooming:

Hazardous waste increases. Technological advancement, cheap labor, planned obsolescence and lack of strict and enforceable regulation make discarded electronics the world's fastest-growing source of waste. Globally this is 41 metric tons per year and in North America this is 11 metric tons per year. (65) Electronics including cell phones, computers, Wi-Fi routers contain toxic materials such as lead, mercury and cadmium, brominated flame retardants and hexavalent chromium in addition to rare earth elements and precious minerals that could be recycled (urban mine). The hazardous components can harm the environment and people.

A Trillion IoT Devices planned. The federal Resource Conservation and Recovery Act addresses hazardous waste however E-waste is exempt and considered regular waste. Although over 25 states have laws requiring recycling, companies can ship their waste overseas legally and as seen in a recent study by MIT illegal shipments are common. It showed that about **a third of electronics in the U.S. are illegally shipped to foreign ports and dismantled by children and low income workers.** The plastic is burned causing toxic air pollution and drinking water contamination. (57,58) Estimates are up to a trillion devices with IoT capability by 2035. (112)

3) Public Health Concerns:

No Evidence of Safety for 5G. The telecommunications industry is rolling 5G antennas out so rapidly that they are ahead of any evidence that this will be safe for the public or the environment. The frequencies, modulation and power have not been fully vetted by industry, let alone given consideration of the long term adverse effects of this widespread exposure to the public. Current FCC testing looks only at heat or thermal damage, not the biological effects widely demonstrated in the literature. This bill gives industry the power to place antennas even if it is deemed by scientific experts potentially unsafe or harmful to humans or wildlife.

Evidence of biologic harm is established. Despite industry claims of safety, scientific evidence clearly demonstrates non-thermal biological harm to cellular structures including DNA, proteins and cell membranes that can lead to cancer, reproductive failure and neurologic dysfunction. Almost every study on sperm effects shows abnormal changes in structure and function of normal sperm at non-thermal level of wireless radiation that people are already exposed to. A plethora of studies show direct harm to brain cells which indicate a contribution to neurodegeneration is highly likely. Studies have demonstrated one mechanism to be that of oxidation causing cellular disruption, similar to other toxic exposures. Research has shown an association between radiofrequency EMR exposure and a variety of health issues, in addition to injury to trees, plants, wildlife and insects. With all this science of harm, how can further expansion of wireless be reasonable? (85-96)

Electro-sensitivity rising and identified in firefighters who are exempt from cell tower legislation in SB649. More people in all walks of life are reporting vague symptoms of headaches, insomnia, mental confusion, heart palpitations and fatigue in the presence of wireless devices and when in close proximity to cell towers. This is consistent with various studies internationally which show 3 to 10% of the population are electrosensitive. NASA, the Department of Defense, the EPA and other countries recognize microwave illness, a.k.a. electrosensitivity as a real medical diagnosis. (3,4,5,6,8,19,41)

The International Association of Firefighters (IAFF) developed a policy that supports their successful efforts to have cell towers blocked from placement on their fire stations after noting that many of their firefighters became sick (classic symptoms of microwave illness) after cell towers were placed on or near their facilities. A pilot study of California firefighters was conducted in 2004 following a five-year exposure to a cell tower next to the station. The men were found to have brain abnormalities on SPECT brain scan consistent with their symptoms of severe headaches, insomnia, irritability, mental confusion. In addition, performance testing revealed delayed reaction time, lack of impulse control, and cognitive impairment. (113) These are not symptoms we want to see in our first responders. These are not symptoms we want to see in our general population. It is notable that these were healthy men who had not worked HazMat, so chemical exposure was not a variable. Most important of all, nearly everyone else in the population is more vulnerable than our firefighters.

Firefighters have an exemption in SB649 due to health concerns, thus codifying that health issues are a legitimate argument. This request for exemption is supported by international studies which have looked at health effects of those living near cell towers. The majority of published studies in different countries have shown a relationship between distance from base stations and a variety of health complaints. They have found that the closer to the towers people live (less than 300 meters) there is an increase incidence of reported symptoms including headache, lack of concentration, memory loss, irritability, depression, insomnia, fatigue, loss of libido, nausea, lack of appetite. (77-84)

Cell towers found to cause blood abnormalities. In a recent study from India, Zothansiam et al (2017), researchers examined abnormalities in blood samples in people living at different distances from cell towers. They identified a significant increase blood cell damage in those living within 80 meters of a cell tower versus those living greater than 300 meters from a cell tower. They found 1) A significant increase in micronuclei, which are small remnants of DNA nuclear material appearing within blood cells and a sensitive indicator of genotoxicity and chromosomal abnormalities 2) An increase in lipid peroxidation indicating free radical formation and cell membrane damage 3) A reduction in levels of internally produced antioxidant capacity (glutathione, catalase and superoxide dismutase). (77)

The author concluded “The present study demonstrated that staying near the mobile base stations and continuous use of mobile phones damage the DNA, and it may have an adverse effect in the long run. The persistence of DNA unrepaired damage leads to genomic instability which may lead to several health disorders including the induction of cancer.” As more base stations are deployed with higher density and with ubiquitous connection this wireless technology is poised

to contribute to the trillions of dollars spent annually on chronic diseases related to these and other toxic exposures.

Exposure to electromagnetic frequencies will increase and harm will be additive. There will be no reduction in the microwave frequencies we are already exposed to with 5G expansion. In addition, 4G technology will likely be placed in small cell antenna prior to 5G systems. 5G technology is even less well studied but evidence to date shows adverse health effects. (1) According to the 1996 Telecommunications Act, once a structure is designated as a cell tower site modifications can be made and other telecommunications systems can be added if it will not result in a “substantial change”. There is a lack of monitoring of current infrastructure for both levels of radiation and basic safety. More work needs to be done by scientists and legislators prior to this massive increase in cell towers.

4) Liability Concerns

In a 2013 Emerging Risk Report, Zurich based Swiss Re, the second-largest reinsurer in the world and the insurer of the World Trade Center, listed electromagnetic fields in the highest category of casualty risk due to “unforeseen consequences” beyond 10 years. They and many other companies will not cover damages due to wireless products and infrastructure. (24) There is a general insurance exclusion now applied across the market as standard. The purpose of the exclusion they state is to exclude coverage for illnesses caused by continuous long-term non-ionizing radiation exposure. (18,19) The insurance industry already knows of the harm from wireless devices and infrastructure. (108)

Cities have learned some unfortunate lessons regarding general liability for fires or other accidents from cell towers and wireless infrastructure that they cannot regulate. The fire in Malibu in 2007 due to overloaded poles is an example of problems that can occur. (25,26)

We need to slow down and put in place policies which address privacy, security, radiofrequency radiation exposure monitoring as well as health, and environmental precautions before proceeding with new technologies such as 5G or Air Gig expansion, as Europe is doing. (55, 56, 60, 110) Perhaps AT&T’s practices should be investigated. (109, 110, 11) It is inappropriate to streamline expansion of these new small cell antennas until updated standards are developed. While profits may be realized in the short term, indirect costs will overshadow those in the long run.

Thank you for your thoughtful consideration to protect the health, safety and vitality of California.

Cindy Russell, M.D.

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References

- 1) **A 5G Wireless Future: Will it give us a Smart Nation or contribute to an Unhealthy One?** SCCMA Bulletin. Jan/Feb 2017.
<http://www.sccma-mcms.org/Portals/19/assets/docs/A%205G%20Wireless%20Future%20Formatted%20PDF.pdf?ver=2017-03-23-094719-157>
or https://issuu.com/18621/docs/bulletin_0217_web
- 2) **"What's the Diagnosis Doctor?"** Dr. Scott Eberle. SCCMA Bulletin Nov 2016. <http://www.sccma-mcms.org/NewsEvents/BulletinMemberMagazine.aspx>
- 3) **Reliable disease biomarkers characterizing and identifying electrohypersensitivity and multiple chemical sensitivity as two etiopathogenic aspects of a unique pathological disorder.** Belpomme, D. Rev Environ Health. 2015;30(4):251-71. <https://www.ncbi.nlm.nih.gov/pubmed/26613326>
- 4) **American Planning Association letter in opposition to SB649.**
http://www.rcrcnet.org/sites/default/files/useruploads/County_Operations/Telecommunications/2017_18_Letters/SB_649_Joint_Ltr_to_Sen_UEC_Comm_03302017.pdf
- 5) **BioInitiative Working Group**, Cindy Sage and David O. Carpenter, Editors. BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation at www.bioinitiative.org, December 31, 2012 at www.bioinitiative.org
- 6) **National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation.** May 2016. <https://ntp.niehs.nih.gov/results/areas/cellphones/>
- 7) **Radiofrequency radiation injures trees around mobile phone base stations.** Waldmann-Selsam C. Sci Total Environ. 2016 Dec 1;572:554-569 <https://www.ncbi.nlm.nih.gov/pubmed/27552133>.
- 8) **Current State and Implications of Research on Biological Effects of Millimeter Waves: A Review of the Literature.** Andrei G. Pakhomov. Bioelectromagnetics 19:393–413 (1998). <http://www.rife.org/otherresearch/millimeterwaves.html>
- 9) **Comparison of blood pressure and thermal responses in rats exposed to millimeter wave energy or environmental heat.** Millenbaugh NJ. Shock. 2006 Jun;25(6):625-32. <https://www.ncbi.nlm.nih.gov/pubmed/16721271>
- 10) **Overpowered: What science tells us about the dangers of cell phones and other WiFi age devices.** Dr. martin Blank. 2014.
- 11) **City Rights in an Era of State Preemption.** Jan 2017. <http://nlc.org/sites/default/files/2017-02/NLC%20Preemption%20Report%202017.pdf>
- 12) **Study of the in vitro cytotoxicity testing of medical devices.** WEIJIA LI Biomed Rep. 2015 Sep; 3(5): 617 620 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4535150/>
- 13) **The Cloud Begins with Coal: Big Data, Big Networks, Big Infrastructure and Big Power. An Overview of the Electricity Used by the Global Digital Ecosystem.**
https://www.tech-pundit.com/wp-content/uploads/2013/07/Cloud_Begins_With_Coal.pdf
- 14) **The Surprisingly Large Energy Footprint of the Digital Economy [UPDATE].** Aug 14, 2013.
<http://science.time.com/2013/08/14/power-drain-the-digital-cloud-is-using-more-energy-than-you-think/>

- 15) Energy Consumption in Wired and Wireless Access Networks.** Baliga J. University of Melbourne. IEEE Communications Magazine • June 2011. <http://people.eng.unimelb.edu.au/rtucker/publications/files/energy-wired-wireless.pdf>
- 16) Small Network Equipment Energy Consumption in U.S. Homes.** NRDC. June 2013. <https://www.nrdc.org/sites/default/files/residential-network-IP.pdf>
- 17) Wireless Facility Siting: Section 6409(a) Checklist.** http://www.ctia.org/docs/default-source/fcc-filings/6409_a_siting-checklist-final.pdf?sfvrsn=0
- 18) Maxum Indemnity company.** <http://nebula.wsimg.com/88c181233d63418327a560f273a99a4d?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1>
- 19) Insurers exclude risks associated with electromagnetic radiation.** Business Insurance. 6/3/2007. <http://www.businessinsurance.com/article/20070603/ISSUE03/100022051/insurers-exclude-risks-associated-with-electromagnetic-radiation>
- 20) EMF Scientists Appeal** to the United Nations and the WHO for more protective EMF guidelines. <https://www.emfscientist.org>
- 21) Safety considerations for the cabling installer.** <http://www.cablinginstall.com/articles/print/volume-9/issue-2/contents/installation/safety-considerations-for-the-cabling-installer.html>
- 22) Fiber, Copper, or Wireless: Which Connection Is Best for Your Company?** Small Business Trends. August 2015. <https://smallbiztrends.com/2015/08/fiber-optic-copper-wireless-internet-transmission-methods.html>
- 23) Advantages and Disadvantages of Wired vs Wireless Internet Connection.** Nov 2016 <http://buytelephonesystem.com/advantagesdisadvantages-wiredwireless-internet-connection-business/> “The main drawback of an entirely wireless Internet connection is security. Even if you utilize passwords, it is much easier to install malware on wireless networkers. This problem is even more likely if employees are allowed to access the network with their personal devices.
- 24) Swiss Re Sonar: Emerging Risk Insights** <http://www.stopumts.nl/pdf/Zwitserland%20Swiss%20Reinsurance%202013.pdf>
- 25) Newest Agoura cell tower even has firemen upset.** http://www.theacorn.com/news/2015-03-05/Front_Page/Newest_Agoura_cell_tower_even_has_firemen_upset.html
- 26) Edison agrees to pay \$37 million in 2007 wildfire.** May 21, 2013. <http://articles.latimes.com/2013/may/21/local/la-me-0521-malibu-fire-settlement-20130521>
- 27) Polarization: A Key Difference between Man-made and Natural Electromagnetic Fields, in regard to Biological Activity.** Dimitris J. Panagopoulos. *Scientific Reports* 5, Article number: 14914 (2015). 12 October 2015. <https://www.nature.com/articles/srep14914>
- 28) Your Data Is Dirty: The Carbon Price of Cloud Computing** . April 2, 2014. <http://time.com/46777/your-data-is-dirty-the-carbon-price-of-cloud-computing/>
- 29) Running Out of Energy?** March 16, 2016 <http://semiengineering.com/running-out-of-energy/>
- 30) The Surprisingly Large Energy Footprint of the Digital Economy [UPDATE].** Aug 14, 2013. <http://science.time.com/2013/08/14/power-drain-the-digital-cloud-is-using-more-energy-than-you-think/>

- 31) The Power of the Wireless Cloud. An Analysis of the Impact on Energy Consumption of the Growing Popularity of Accessing Cloud Services Via Wireless Devices.** 2013. University of Melbourne.
<http://www.ceet.unimelb.edu.au/publications/ceet-white-paper-wireless-cloud.pdf>
- 32) The Cloud Begins with Coal: Big Data, Big Networks, Big Infrastructure and Big Power. An Overview of the Electricity Used by the Global Digital Ecosystem.**
https://www.tech-pundit.com/wp-content/uploads/2013/07/Cloud_Begins_With_Coal.pdf
- 33) American Brain Tumor Association Adolescent and Young Adult Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2008-2012.** *Ostrom QT. Neuro Oncol.* 2016 Jan;18 Suppl 1:i1-i50. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4690545/>
- 34) Dept. of Interior to National Telecommunications and Information Administration Regarding Adverse Impact of Cell Tower Radiation on Wildlife.**
https://www.ntia.doc.gov/files/ntia/us_doi_comments.pdf
- 35) Federal Communications Commission. 2006. Effects of communication towers on migratory birds. Notice of Proposed Rulemaking,** WT Docket No. 03-187, FCC 06-164, Federal Register 71(225): 67510-67518, November 22.
<http://apps.fcc.gov/ecfs/document/view;jsessionid=nCRdSVrXPXQhlpnr8lbQC3GZQcvNnKhgHnnJWgTLQ2ZCRV3DCsFe!1357496456!-1864380355?id=6518724776>
- 36) Report on possible impacts of communication towers on wildlife including birds and bees.** Ministry of Environment and Forests. 2011. <http://www.indiaenvironmentportal.org.in/content/341385/report-on-possible-impacts-of-communication-towers-on-wildlife-including-birds-and-bees/>
- 37) Impacts of radio-frequency electromagnetic field (RF-EMF) from cell phone towers and wireless devices on biosystem and ecosystem—A review.** Sivani Saravanamuttu. January 9. 2013.
https://www.researchgate.net/publication/258521207_Impacts_of_radio-frequency_electromagnetic_field_RF-EMF_from_cell_phone_towers_and_wireless_devices_on_biosystem_and_ecosystem-A_review
- 38) THE EFFECTS OF MICROWAVES ON THE TREES AND OTHER PLANTS.** http://www.hese-project.org/de/emf/WissenschaftForschung/Balmori_Dr._Alfonso/showDoc.php?lang=de&header=Dr.%20Balmori&file=THE%20EFFECTS%20OF%20MICROWAVES%20ON%20THE%20TREES%20AND%20OTHER%20PLANTS.html&back=../showAuthor.php?target=Balmori_Dr._Alfonso
- 39) THE EFFECTS OF MICROWAVE RADIATION ON THE WILDLIFE. PRELIMINARY RESULTS.** Alfonso Balmori Martínez. Feb 2003.
<http://www.whale.to/b/martinez.pdf>
- 40) Weak Broadband Electromagnetic Fields are More Disruptive to Magnetic Compass Orientation in a Night-Migratory Songbird (Erithacus rubecula) than Strong Narrow-Band Fields.** 2016. *Front Behav Neuroscience.* March 2016. <http://www.ncbi.nlm.nih.gov/pubmed/?term=PMID%3A+27047356> “Our results indicated that the magnetic compass orientation of European robins could not be disrupted by any of the relatively strong narrow-band electromagnetic fields employed here, but that the weak broadband field very efficiently disrupted their orientation”
- 41) Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird.** Engels, S. *Nature.* Jan 2014. <http://www.nature.com/nature/journal/v509/n7500/abs/nature13290.html>
- 42) Electromagnetic Radiation of Mobile Communication Antennas Affects the Abundance and composition of Wild Pollinators.** Lazaro, A. *Journal of Insect Conservation* react-text: 61 20(2):1-10 /react-text react-text:

64 · /react-text react-text: 65 April 2016.

https://www.researchgate.net/publication/301647025_Electromagnetic_radiation_of_mobile_telecommunication_antennas_affects_the_abundance_and_composition_of_wild_pollinators

43) Effect of Electromagnetic (cell phone) radiations on Apis mellifera. Dalio, J. Journal of Research in Agriculture and Animal Science Volume 2 ~ Issue 12 (2015) pp:06-10. Feb. 2015.
<http://questjournals.org/jraas/papers/vol3-issue1/B310610.pdf>

44) Effect of high-frequency radiations on survival of the honeybee (Apis mellifera L.). Darney, K. Apidologie react-text: 55 47(5) /react-text react-text: 58 · /react-text react-text: 59 December 2015.
https://www.researchgate.net/publication/287972544_Effect_of_high-frequency_radiations_on_survival_of_the_honeybee_Apis_mellifera_L

45) Is Electromagnetism one of the causes of the CCD? A work plan for testing this hypothesis. Marie-Claire Cammaerts. Journal of Behavior. 2 (1): 1006. March 28, 2017.

46) Plant Responses to High Frequency Electromagnetic Fields. A Vian. BioMed Research International. Volume 2016 (2016) <https://www.hindawi.com/journals/bmri/2016/1830262/>

47) Report on Possible Impacts of Communication Cell Towers on Wildlife Including Birds and Bees. The Ministry of Environment and Forest. 2010. http://www.moef.nic.in/downloads/public-information/final_mobile_towers_report.pdf

48) International Agency for Research on Cancer. IARC Classifies Radiofrequency Electromagnetic Fields as Possibly Carcinogenic to Humans.
http://www.iarc.fr/en/media-centre/pr/2011/pdfs/pr208_E.pdf

49) 1996 Telecommunications Act. <https://www.fcc.gov/general/telecommunications-act-1996>

50) Local Governments Cannot Regulate Environmental Effects of Cellular Telephone Towers.
http://www.honigman.com/media/site_files/401_imgimgWeissA406289.pdf

51) "What's the Diagnosis Doctor?" Dr. Scott Eberle. SCCMA Bulletin Nov 2016. <http://www.sccma-mcms.org/NewsEvents/BulletinMemberMagazine.aspx>

52) ARTICLE I DECLARATION OF RIGHTS [SECTION 1 - SEC. 32] CA.
https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=CONS&division=&title=&part=&chapter=&article=1

53) Americans with Disability. <https://www.access-board.gov/research/completed-research/indoor-environmental-quality/introduction>

54) City Rights in an Era of State Preemption. Jan 2017. <http://nlc.org/sites/default/files/2017-02/NLC%20Preemption%20Report%202017.pdf>

55) EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. <https://www.ncbi.nlm.nih.gov/pubmed/27454111>
<https://www.degruyter.com/view/j/revh.2016.31.issue-3/revh-2016-0011/revh-2016-0011.xml>

56) The potential dangers of electromagnetic fields and their effect on the environment. European Parliament.
<http://assembly.coe.int/nw/xml/XRef/Xref-XML2HTML-en.asp?fileid=17994>

57) America's Toxic Electronic Waste Trade. April 22, 2016. <https://www.usnews.com/news/articles/2016-04-22/the-rising-cost-of-recycling-not-exporting-electronic-waste>

- 58) **Where does America's e-waste end up? GPS tracker tells all.** May 6, 2016.
<http://www.pbs.org/newshour/updates/america-e-waste-gps-tracker-tells-all-earthfix/>
- 59) **Senate Bill S19 Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act or the MOBILE NOW Act.** <https://www.congress.gov/bill/115th-congress/senate-bill/19>
- 60) **France: Law on Public Exposure to Electromagnetic Waves Adopted.** Feb 5, 2015.
<http://www.loc.gov/law/foreign-news/article/france-law-on-public-exposure-to-electromagnetic-waves-adopted/>
- 61) **Senate Bill S88- The Digital Act- Developing Innovation and Growing the Internet of Things Act.**
<https://www.govtrack.us/congress/bills/115/s88/text>
<https://www.congress.gov/bill/115th-congress/senate-bill/88>
- 62) **Electronic waste – an emerging threat to the environment of urban India.** [Santhanam Needhidasan . J Environ Health Sci Eng.](#) 2014; 12: 36. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3908467/>
- 63) **Electronic Waste Recycling Act- SB 20 (Sher), SB50(Sher)**
<http://www.dtsc.ca.gov/HazardousWaste/EWaste/MoreInfo.cfm>
- 64) **Electronics Take Back Coalition.** <http://www.electronicstakeback.com/promote-good-laws/federal-legislation/>
- 65) **The Global E-Waste Monitor.** Quantities, Flows and Resources. United Nations University. 2014.
<http://i.unu.edu/media/ias.unu.edu-en/news/7916/Global-E-waste-Monitor-2014-small.pdf>
- 66) **Toxic and Hazardous Materials in Electronics.** Environment Canada. 2001.
<https://circabc.europa.eu/sd/a/187015aa-1727-48ba-b621-8273ea2b523c/ITHazardousMat.pdf>
- 67) **How U.S. Laws Do (and Don't) Support E-Recycling and Reuse.** April 6, 2016.
<http://knowledge.wharton.upenn.edu/article/how-u-s-laws-do-and-dont-support-e-recycling-and-reuse/>
- 68) **Assembly Bill AB32 Overview.** ARB. <https://www.arb.ca.gov/cc/ab32/ab32.htm>
- 69) **An Internet of Things that will number ten billions by 2020, there will be 21 billion connected devices in a global Internet of Things:** Gartner Group .
<http://www.cnn.com/2016/02/01/an-internet-of-things-that-will-number-ten-billions.html>
- 70) **Radiofrequency Electromagnetic Radiation and the Health of Canadians.**
Report of the Standing Committee on Health. June 2015.
<http://www.ourcommons.ca/DocumentViewer/en/41-2/HESA/report-13>
http://www.c4st.org/images/hesa-2015/412_HESA_Rpt13-e.pdf
- 71) **Environmental Health Trust Database of Worldwide Policy on Wireless Technology.**
<https://ehtrust.org/policy/international-policy-actions-on-wireless/>
- 72) **WHY FACTS DON'T CHANGE OUR MINDS.**
New discoveries about the human mind show the limitations of reason.
<http://www.newyorker.com/magazine/2017/02/27/why-facts-dont-change-our-minds>
- 73) **ARTICLE I DECLARATION OF RIGHTS [SECTION 1 - SEC. 32] CA.**
https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=CONS&division=&title=&part=&chapter=&article=I
- 74) **Americans with Disability.** <https://www.access-board.gov/research/completed-research/indoor-environmental-quality/introduction>

75) 1996 Telecommunications Act. <https://www.fcc.gov/general/telecommunications-act-1996>

76) **Review and Analysis of Wi-Fi Devices and Radiofrequency Radiation in Schools for the Maryland Children's Environmental Health and Protection Advisory Council.** Spring 2016.

http://phpa.dhmh.maryland.gov/OEHFP/EH/Shared%20Documents/CEHPAC/Wi-Fi%20in%20Classrooms_May2016_Capstone.pdf

77) **Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations.** (2017) Zothansiam et al. *Electromagn Biol Med.* 2017 Aug 4:1-11. <https://www.ncbi.nlm.nih.gov/pubmed/28777669>

78) **Survey of People Living at the Vicinity of Cellular Base Transmitting Stations in an Urban and Rural Locality.** (2016) Sivani Saravanamuttu. *International Journal of Current Research* react-text: 55 8(3):28186-28193. March 2016.

https://www.researchgate.net/publication/301677652_SURVEY_OF_PEOPLE_LIVING_AT_THE_VICINITY_OF_CELLULAR_BASE_TRANSMITTING_STATIONS_IN_AN_URBAN_AND_A_RURAL_LOCALITY

79) **Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays.** (2010) Page 374- Biological Effects at Low intensity) B. Blake Levitt, Henry Lai. *Environmental Reviews*, 2010, 18(NA): 369-395. <http://www.nrcresearchpress.com/doi/full/10.1139/A10-018#.WYUIOHeZNo4>

80) **Neurobehavioral effects among inhabitants around mobile phone base stations.** (2007) Abdel-Rassoul G. *Neurotoxicology*, 2007 Mar;28(2):434-40. <http://www.ncbi.nlm.nih.gov/pubmed/16962663>

81) **Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations.** (2007) H-P Hutter. *Occup Environ Med* 2006;63:307-313. http://oem.bmj.com/content/63/5/307.abstract?ijkey=9ae18f97484bfbf95e6f8c3eb92b69fe356ef640&keytype2=tf_ipscsha

82) [Subjective symptoms reported by people living in the vicinity of cellular phone base stations: review]. (2004) Bortkiewicz A. *Poland. Med Pr.* 2004;55(4):345-51. <http://www.ncbi.nlm.nih.gov/pubmed/15620045>

83) [Symptoms experienced by people in vicinity of base stations: II/ Incidences of age, duration of exposure, location of subjects in relation to the antennas and other electromagnetic factors]. (2003) Santini R. *Pathol Biol (Paris)*. 2003 Sep;51(7):412-5. <http://www.ncbi.nlm.nih.gov/pubmed/12948762>

84) **Increased incidence of cancer near a cell-phone transmitter station.** Israel. Wolf, R., Wolf, D. *International Journal of Cancer Prevention* Vol 1, Number 2, April 2004.

https://www.researchgate.net/publication/228490892_Increased_incidence_of_cancer_near_a_cell-phone_transmitter_station <https://www.emf-portal.org/en/article/19820>

85) **Maternal exposure to a continuous 900-MHz electromagnetic field provokes neuronal loss and pathological changes in cerebellum of 32-day-old female rat offspring.** *J Chem Neuroanat.* 2015 Sep 21. Odaci E. <http://www.ncbi.nlm.nih.gov/pubmed/26391347>

86) **900 MHz electromagnetic field exposure affects qualitative and quantitative features of hippocampal pyramidal cells in the adult female rat.** Bas O. *Brain Res.* 2009 Apr 10;1265:178-85. <http://www.ncbi.nlm.nih.gov/pubmed/19230827>

87) **Maternal mobile phone exposure adversely affects the electrophysiological properties of Purkinje neurons in rat offspring.** Haghani M. *Neuroscience.* 2013 Oct 10;250:588-98. <http://www.ncbi.nlm.nih.gov/pubmed/23906636>

- 88) Cell phone radiation exposure on brain and associated biological systems.** Kesari KK. *Indian J Exp Biol.* 2013 Mar;51(3):187-200. <http://www.ncbi.nlm.nih.gov/pubmed/23678539>
- 89) Pernicious effects of long-term, continuous 900-MHz electromagnetic field throughout adolescence on hippocampus morphology, biochemistry and pyramidal neuron numbers in 60-day-old Sprague Dawley male rats.** Kerimoğlu G. doi: 10.1016/j.jchemneu.2016.07.004. Epub 2016 Jul 16. <https://www.ncbi.nlm.nih.gov/pubmed/27430379>
- 90) Exacerbation of demyelinating syndrome after exposure to wireless modem with public hotspot. Case report.** Johansson O, Redmayne M. *Electromagnetic Biology and Medicine.* Jun 29, 2016. <http://www.tandfonline.com/doi/abs/10.3109/15368378.2015.1107839>
- 91) Gray matter abnormalities in Internet addiction: a voxel-based morphometry study.** Zhou, Y. *Eur J Radiol.* 2011 Jul;79(1):92-5. <https://www.ncbi.nlm.nih.gov/pubmed/19926237>
- 92) Continuous exposure to 900MHz GSM-modulated EMF alters morphological maturation of neural cells.** Del Vecchio et al. *Neurosci Lett.* 2009 May 22;455(3):173-7. <https://www.ncbi.nlm.nih.gov/pubmed/19429115>
- 93) Temporal trends in sperm count: a systematic review and meta-regression analysis. (2017)** Hagai Levine. 25 July 2017. <https://academic.oup.com/humupd/article/doi/10.1093/humupd/dmx022/4035689/Temporal-trends-in-sperm-count-a-systematic-review>
- 94) Effect of mobile telephones on sperm quality: a systematic review and meta-analysis. (2014)** Adams JA, Galloway TS. *Environ Int.* 2014 Sep;70:106-12. <http://www.ncbi.nlm.nih.gov/pubmed/24927498>
- 95) Association between mobile phone use and semen quality: a systemic review and meta-analysis. (2014)** Liu K. *Andrology.* 2014 Jul;2(4):491-501. <https://www.ncbi.nlm.nih.gov/pubmed/24700791>
- 96) Effects of the exposure to mobile phones on male reproduction: a review of the literature. (2012)** La Vignera S. *J Androl.* 2012 May-Jun;33(3):350-6. <http://www.ncbi.nlm.nih.gov/pubmed/21799142>
- 97) \$99 million in fines urged over power poles that sparked fire.** LA Times .Oct 23, 2011. <http://articles.latimes.com/2011/oct/23/local/la-me-utility-pole-fines-20111023>
- 98) SoCal Edison Escapes \$4M Verdict In Stray Currents Case.** February 9, 2015. <https://www.law360.com/articles/619958/socal-edison-escapes-4m-verdict-in-stray-currents-case>
- 99) Simona Wilson vs Southern California Edison.** 2/9/15 <http://law.justia.com/cases/california/court-of-appeal/2015/b249714.html>
- 100) Conduction of Electrical Current to and Through the Human Body: A Review.** Raymond M. Fish and Leslie A. Geddes. . *Eplasty.* 2009; 9: e44. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2763825/>
- 101) Ground Currents: An Important Factor in Electromagnetic Exposure.** Duane A. Dahlberg, Ph.D. <http://www.sandiegocounty.gov/dplu/ceqa/Soitec-Documents/Record-Documents/Undated-Duane-A-Dahlberg-Report-re-Ground-Currents-An-Important-Factor-in-Electromagnetic-Exposure.pdf>
- 102) Popular Internet of Things Forecast of 50 Billion Devices by 2020 Is Outdated.** August 18, 2016. <https://spectrum.ieee.org/tech-talk/telecom/internet/popular-internet-of-things-forecast-of-50-billion-devices-by-2020-is-outdated>
- 103) White Paper: The economics of a trillion connected devices.** June 2017. ARM. <https://community.arm.com/iot/b/blog/posts/white-paper-the-route-to-a-trillion-devices>

104) Chronic Disease Overview. Chronic Diseases: The Leading Causes of Death and Disability in the United States. CDC. June 2017. <https://www.cdc.gov/chronicdisease/overview/index.htm>

105) NASA Report – Electromagnetic Field Interactions with the Human Body: Observed Effects and Theories. April 1981. Jeremy Raines, PhD. <https://ntrs.nasa.gov/search.jsp?R=19810017132>

106) Defense Intelligence Agency: Biological Effects of Electromagnetic Radiation (Radiowaves and Microwaves) in Eurasian Communist Countries. October 10, 1975. Prepared by Army Medical Intelligence and the office of the Surgeon General.
http://www.cqipe.ca/pdf/BIOLOGICAL_EFFECTS_OF_ELECTROMAGNETIC_RADIATION.pdf

107) Naval Military Research Institute. Bibliography of Reported Biologic Phenomena (“Effects”) and Clinical Manifestations to Microwave and Radiofrequency Radiation. October 4, 1971. With supplement 2,300 studies are included. <https://www.scribd.com/document/44544868/20091016-Naval-Studies>

108) A Coming Storm for Wireless? Gloria Vogel. Talk Markets. Thursday, July 27, 2017
<http://www.talkmarkets.com/content/stocks--equities/a-coming-storm-for-wireless?post=143501&page=2>

109) Californians Paid Billions Extra: The State Assembly Should Investigate AT&T’s Cross-Subsidies. Aug 23, 2017.<http://www.huffingtonpost.com/entry/599d26bee4b0b87d38cbe637>

110) AT&T, ALEC, FCC. The FCC’s plans are based on AT&T’s Petition, which is from ALEC Model Legislation. Bruce Kushnick. May 5, 2017. http://www.huffingtonpost.com/entry/att-alec-fcc-the-fccs-plans-are-based-on-atts_us_590e8074e4b046ea176aec17

111) Expose: AT&T California Fiber Optic Scandal: Billions Charged for Broadband that Never Showed Up. August 28, 2017. Huffington Post. <http://www.huffingtonpost.com/entry/59a4ce47e4b0b234aecad1c7>

112) AT&T’s multi-gigabit wireless over power lines heading to trials this year. Project AirGig will get first trials this fall, in US and abroad. 1/31/17. <https://arstechnica.com/information-technology/2017/01/att-teams-with-power-companies-to-trial-broadband-over-power-lines/>

113) INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

DIVISION OF OCCUPATIONAL HEALTH, SAFETY AND MEDICINE

Position on the Health Effects from Radio Frequency/Microwave (RF/MW) Radiation in Fire Department Facilities from Base Stations for Antennas and Towers for the Conduction of Cell Phone Transmissions. 2011.
<http://www.iaff.org/HS/Facts/CellTowerFinal.asp>