

Dear US Senate Committee on Commerce, Science, and Transportation:

I am a mother of 2 boys, ages 8 and 12, a chemical engineer, and recently, a homeschooling parent. Three years ago my oldest son, who was only 9 at the time, became ill from two cell towers installed right next to his school. Since that exposure, he became sensitized to wireless radiation, particularly school wi-fi. His symptoms when exposed to wireless radiation included insomnia, digestive problems, severe allergies, painful skin rashes, headaches, and other neurological and immunological symptoms. (I have physician diagnosis and proof that his illness was caused by wireless radiation) His reaction to wi-fi and cell tower radiation has become so severe that our lives have changed forever – from choosing the location of our home and schools (to avoid cell towers) to avoiding areas with high levels of wireless radiation such as public parks with cell towers. My younger son developed problems as well, but to a lesser degree (because of his shorter exposure time to the school cell towers). This year, because of the prevalence of wi-fi in schools and smart phones and wireless devices among students, I had to begin homeschooling my kids for the sake of their health. It was something we did not plan on but had to do out of necessity. My husband, who has a PhD in Chemical Engineering, and I had both hoped that our boys would pursue a career in science, engineering or medicine, but now that they become ill in the presence of wireless radiation, how will they attend college when just about every college campus has a cell tower and uses wi-fi? And now with FCC's plan to speed 5G to market, which would put small cell antennas on every residential street, how will I protect my boys? My hope is that you will listen to what I have to say and take action. It is within your power.

Thus I am writing to let you know of my opposition to the FCC's plan to speed 5G to market which would require a "massive" increase in infrastructure in FCC Chairman Tom Wheeler's own words. Currently, there is more than enough infrastructure to provide cellular services to everyone in the US – as of December 2015, there are 308,000 cell antenna facilities for 378 million wireless subscribers (current US population is 321 million), which is 116% market penetration. Per the CTIA, the number of cell towers in the US increased from 66,000 in 1998 to 300,000 in 2013, providing cell service to more than 335 million cell phones in 2013 (104% market penetration in 2013). This exceeds 1 cell phone per person in this country

<http://www.ctia.org/your-wireless-life/how-wireless-works/annual-wireless-industry-survey>

5G is for fast data transmission (i.e. pictures, videos, etc), not for voice services, which is already served by 3G. 5G will require “massive infrastructure” of small cell antenna sites in addition to the 308,000 cell antenna facilities already in place. <https://www.fcc.gov/document/remarks-chairman-wheeler-future-wireless>

On September 7, 2016, at the CTIA Super Mobility Show in Las Vegas, Tom Wheeler said there will be “hundreds of thousands, maybe even millions of new antennas”

http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0907/DOC-341138A1.pdf

Because the frequency used in 5G will be much higher than what has been used for 2G, 3G and 4G, transmission distances will be much shorter and the number of small cell sites required will be SEVERAL TIMES greater than the 308,000 macro cell towers already in place across the country. This proposal is similar to what was proposed by CA Assembly Bill 2788 in June, in which CA Assemblyman Mike Gatto gutted a natural gas storage bill intended to help the Porter Ranch residents and turned it into a bill to install small cell antenna facilities (for 5G) on every public school, government building (except fire stations), and light and telephone poles without approval by local government.

http://celltowersites.com/wp-content/uploads/2016/06/20150AB2788_97.pdf

Californians were outraged by this proposal which fortunately forced Gatto to withdraw the bill.

FCC Chairman Tom Wheeler is pushing for 5G in the name of “national priority.” How is the ability to watch videos and download pictures at fast speeds a “national priority?” While the ability to do this is a huge convenience, it is not a true “national priority.”

“National priority” is addressing the astounding increases in autism, ADHD, neurological disorders in children and adults, autoimmune disease and dementia/Alzheimer’s which has been occurring in the last couple decades which coincided with the massive deployment of cell antenna facilities, which began with the 1996 Telecommunications Act. We went from 66,000 cell towers in 1998 to 300,000 in 2013 per the CTIA as mentioned above. Is someone close to

you afflicted with autism, ADHD, neurological diseases, autoimmune disease, dementia or Alzheimer's?

- Feb. 24, 2016: [the American Brain Tumor Association has found that brain cancer is the highest cause of cancer deaths in ages 15-39 and the most common cancer among 15-19 year olds.](#) There's also been an [increase in Malignant Brain and Central Nervous System Tumors in American children](#). For ages 0-14 between 2000-2010, it has increased annually 0.6%/yr. In ages 15-19, between 2000-2008, it has increased annually 1.0%/yr.
- October 2010: [Autism has increased 600% in prevalence over the last two decades.](#)
- [ADHD has increased 53% in the US over the last decade](#) per the CDC. For ages 14 to 17, 19 % of boys and 10% of girls now have ADHD.
- August 2015: Washington Post reports people are developing dementia a decade earlier compared to 20 years ago (2010 vs. 1990) The disease is now regularly diagnosed in people in their late 40s and death rates from early onset dementia are soaring. The study found that deaths caused by neurological disease had risen significantly in adults aged 55 to 74 and more than doubled in the over-75 population overall. The problem was particularly acute in the United States, where neurological deaths in men aged over 75 have nearly tripled and in women increased more than fivefold. "The rate of increase in such a short time suggested a silent or even a hidden epidemic, in which environmental factors must play a major part, not just aging." The environmental factors cited included chemical pollution and increased background electromagnetic fields (which includes wireless radiation)
https://www.washingtonpost.com/world/people-are-developing-dementia-earlier-and-dying-of-it-more-a-study-shows/2015/08/06/599b16b8-3c0a-11e5-8e98-115a3cf7d7ae_story.html?wprss=rss_world
- October 2013: The NIMH (National Institute of Mental Health) reported 25-30% of kids between ages 13-18 will experience an anxiety disorder. This is an increase of 20 fold (i.e. 1900%) over the last 30 years
<http://health.usnews.com/health-news/health-wellness/articles/2013/10/10/how-to-cope-when-school-anxiety-lingers>

- November 2013: Time Magazine reports that the rate of reported anxiety disorders among U.S. troops jumped 327% between 2000 and 2012.
<http://swampland.time.com/2013/11/05/anxiety-disorders-on-the-rise-in-the-ranks/>
- September 2007: The number of American children and adolescents treated for [bipolar disorder](#) increased 40-fold [that's 3900%!] from 1994 to 2003 The senior author of the study, Dr. Mark Olfson of the New York State Psychiatric Institute at the Columbia University Medical Center, said, "I have been studying trends in mental health services for some time, and this finding really stands out as one of the most striking increases in this short a time." The increase makes bipolar disorder more common among children than clinical depression, the authors said.
http://www.nytimes.com/2007/09/04/health/04psych.html?_r=1
- Severe, disabling mental illness has dramatically increased in the United States. "The tally of those who are so disabled by mental disorders that they qualify for Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI) increased nearly two and a half times between 1987 and 2007 For children, the rise is even more startling — a thirty-five-fold [i.e. 3400%!] increase in the same two decades," as Marcia Angell [summarizes](#) In 1998, Martin Seligman, then president of the American Psychological Association, [spoke](#) to the National Press Club about an American depression epidemic: "We discovered two astonishing things ... The first was there is now between 10 and 20 times as much of it [depression] as there was 50 years ago. And the second is that it has become a young person's problem. When I first started working in depression 30 years ago ... the average age of which the first onset of depression occurred was 29.5 ... Now the average age is between 14 and 15."
- In 2011, the [U.S. Centers for Disease Control and Prevention](#) (CDC) reported that antidepressant use in the United States has increased nearly 400 percent in the last two decades, making antidepressants the most frequently used class of medications by Americans ages 18-44 years.
http://www.salon.com/2013/08/26/how_our_society_breeds_anxiety_depression_and_dysfunction_partner/
- In May 2013, CDC reported in "[Mental Health Surveillance Among Children—United States, 2005–2011](#)," the following: "A total of 13%–20%

of children living in the United States experience a mental disorder in a given year, and surveillance during 1994–2011 has shown the prevalence of these conditions to be increasing.”

There are many independent research studies that have shown an effect on nervous and immune systems from RF radiation. Here are just a few

<https://ehtrust.org/science/cell-towers-and-cell-antennae/>

I, like most people, was unaware of the research around cell phones and cell towers. I had assumed, like most people, that our government (FCC) standards were adequate to protect us and the proper research had been done by our government in setting these standards before releasing these products to the public. However, I was shocked to learn the following FACTS:

1) Our government standards for cell phone radiation is NOT based on protection against all harmful effects but only based on thermal limits, i.e., if there is not enough microwave radiation coming from a device or cell tower to cause your tissues to warm up (i.e. cook you), then FCC standards considers it to be a “safe” level. For cell towers, that limit is 1000uW/cm² for 30 minutes for frequencies 1.5GHz and above

<https://www.gpo.gov/fdsys/pkg/CFR-2002-title47-vol1/pdf/CFR-2002-title47-vol1-sec1-1310.pdf> This was not intended to be a chronic exposure limit, but a short-term one intended to protect people from burns. For cell phones and personal devices, the amount allowable is a SAR of 4.0 W/kg to the hands, feet, ears and 1.6W/kg to the head and any other part of the body.

2) Areas within the immediate range of a cell tower (i.e. less than 1000ft) are about 1000 times higher than background levels of RF radiation. Ambient (background) levels of microwave radiation, i.e. levels not immediately close to a cell tower, is around 0.0003uW/cm² (cell phone calls can be made at this level and reception is around 4 bars). However, within the immediate range of a cell tower, i.e. within the first 1000 ft, it can be as high as 0.1-1.0uW/cm². While both these levels are lower than 1000uW/cm², realize that this means that the levels within the immediate vicinity of a cell tower is around 1000 times higher than areas not next to a cell tower. So for people living close to a cell tower or kids attending school next to a cell tower, this exposure which is about 1000 times

higher than ambient levels is for many hours every day for years, not just 30 minutes.

Health effects at 0.1uW/cm² include neurological problems (headaches, insomnia, feelings of nervousness) and immune problems (allergies, cancer). You can see the list here for levels below and above 0.1uW/cm² per the 2012 Bioinitiative Report, which is a compendium of 3800 peer reviewed studies from around the world. <http://www.bioinitiative.org/rf-color-charts/>

Firefighters union IAFF succeeded in 2004 in stopping more cell towers from being erected on firestations for health reasons, citing neurological and immune system effects. <http://www.iaff.org/hs/facts/CellTowerFinal.asp>

3) FDA exempted cell phones from product testing in 1984 on the presumption that if there is not enough RF radiation emitted to cause tissue heating, then it was safe. However, there has been a lot of research showing that even levels of radiation below thermal thresholds have negative health effects. Some even done by our own military

NASA Report, 1981

A NASA report published in April 1981, titled “Electromagnetic Field Interactions with the Human Body: Observed Effects and Theories,” discussed effects of EMF and microwave RF radiation on humans. Effects of microwave radiation reported: headaches, sleep problems, neurological symptoms, cardiac symptoms, memory problems, increased cholesterol, gastritis, ulcers, increased fasting blood glucose, irritability, inability to concentrate, apprehension, and cataracts (clouding of posterior part of lens in those caused by microwave radiation instead of anterior clouding as seen with regular types). Information for the NASA report was collected from over 1,000 written sources that “included journals, conference proceedings, technical reports, books, abstracts, and news items,” <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19810017132.pdf>

Navy Report, 1971

On October 4, 1971, the Naval Medical Research Institute published a research report, “Bibliography of Reported Biological Phenomena (‘Effects’) and Clinical Manifestations Attributed to Microwave and Radio-Frequency Radiation,” which was a compilation of over 2000 references on the biological responses to RF

microwave radiation. It lists well over 100 negative biological effects caused by RF microwave radiation – here’s a partial list: corneal damage, tubular degeneration of testicles, brain heating, alteration of the diameter of blood vessels, liver enlargement, altered sex ratio of births, decreased fertility, sterility, altered fetal development, decreased lactation in nursing mothers, altered penal function, death, cranial nerve disorders, seizures, convulsions, depression, insomnia, hand tremors, chest pain, thrombosis, alteration in the rate of cellular division, anorexia, constipation, altered adrenal cortex activity, chromosome aberrations, tumors, altered orientation of animals, birds and fish, loss of hair, and sparking between dental fillings.

http://www.magdahavas.com/wordpress/wp-content/uploads/2010/06/Navy_Radiowave_Brief.pdf

Air Force Report, 1994

A June 1994 US Air Force document, titled, “Radiofrequency/Microwave Radiation Biological Effects and Safety Standards: A Review,” acknowledges the non-thermal health effects. Stated in its abstract, “It is known that electromagnetic radiation has a biological effect on human tissue.” The introduction of the report states that “researchers have discovered a number of biological dysfunctions that can occur in living organisms” and that “exposure of the human body to RF/MW [radio frequency/microwave] radiation has many biological implications” that range from “innocuous sensation of warmth to serious physiological damage to the eye,” and added that “there is also evidence that RF/MW radiation can cause cancer.” Biological impacts: “damage to major organs, disruption of important biological processes, and the potential risk of cancer,” among many others which include “mutagenic effects,” “cardiovascular effects,” negative effects on chromosomes, and notes that “Soviet investigators claim that exposure to low-level radiation can induce serious CNS [central nervous system] dysfunctions.”

<http://www.emfacts.com/2014/09/us-air-force-rf-review-in-1988-acknowledges-non-thermal-biological-effects/https://electroplague.files.wordpress.com/2014/09/rf-microwave-radiation-biological-effects-rome-labs.pdf>

4) FCC’s priority is faster speeds, not human health and safety.

The 1996 Telecommunications Act was passed by Congress despite these reports from US government agencies that document negative health effects

from microwave RF radiation that were all published before 1996. Section 704 of the TCA disallowed siting decisions for cell tower facilities based on health considerations as long as they don't exceed FCC's (thermal) limits. Aesthetics is the only valid reason for rejection, so many cell towers are camouflaged and disguised. This is how cell towers have ended up on school property and next to residential areas without people's awareness.

Even though doctors, scientists, and various groups have made about 1000 submissions asking the FCC to revisit limits since 2012, little has been done by the FCC. (See Proceeding Number 13-84 on the FCC web site. It is hard to navigate, but you can see the ~1000 submissions here, <http://www.saferemr.com/2014/08/part-i-why-we-need-stronger-cell-phone.html>)

FCC changed the Telecom Act to encompass wireless internet in March 2015 (wireless internet was not included in the 1996 TCA prior to that). There have been only a handful of incidents where the FCC has fined wireless companies for exceeding FCC's thermal limits even though 1 in 10 cell antenna sites exceeded FCC's thermal limits per Wall Street Journal report in 2014

<http://www.wsj.com/articles/cellphone-boom-spurs-antenna-safety-worries-1412293055> , and the fines are paltry (\$50,000) for exceeding FCC's thermal limits. http://www.journalinquirer.com/connecticut_and_region/fcc-keeps-secret-records-from-radiation-probe-at-verizon-s/article_0dbb367e-62d9-11e5-99da-ebeab2025003.html

Yet if speeds are slow, FCC will fine millions. FCC fined AT&T a record \$100 million in June 2015 for not providing speeds as fast as advertised <http://finance.yahoo.com/news/fcc-seeks-100-mn-t-fine-over-unlimited-174431152.html> Clearly FCC's priorities are not human health and safety, and they have not been considered in 5G's implementation.

Exceeding FCC's thermal limits (which causes bodily harm) only received a \$50,000 fine?

But slow download speeds received a \$100 million fine? AM Best, an insurance rating company, said this about the risks of wireless radiation. "what is known is the risk that cell tower workers face. Thermal effects include eye damage, sterility, and cognitive impairments."

<http://www.ambest.com/directories/bestconnect/EmergingRisks.pdf>

5) The only study of effects of chronic exposure to cell phone radiation by our government was reported in May 2016 by the NTP (National Toxicology Program), which showed a statistically significant increase in brain and heart cancer in rats. Cancer showed up in a small but statistically significant portion of the rats who were exposed to below thermal levels of cell phone radiation at 1.5W/kg for 2 years (below FCC SAR limit of 1.6W/kg – iPhone 6 plus has a SAR rating of 1.59W/kg with all antennas on <https://www.sarchecker.com/apple-iphone-6-sar-rating-level-edges-extremely-close-to-legal-limits/>)

The significance of this study is that it is proof (from a US government study) that RF levels below thermal thresholds cannot be assumed to be “safe”.

In medicine, non-thermal levels of microwave radiation have been used for therapeutic uses to treat pain and edema, heal bones, and chronic wounds https://en.wikipedia.org/wiki/Pulsed_radiofrequency – this fact in itself also disproves the claim that there are “no biological effects” from non-thermal levels of microwave radiation. Anything that has a therapeutic effect can also have a negative effect in a different dose or under different conditions. Even extreme consumption of water in a short period of time (“water poisoning” https://en.wikipedia.org/wiki/Water_intoxication) can cause death because of the severe electrolyte imbalance this causes.

6) Other countries – China, Russia, France, India, Switzerland, Italy, Luxemborg, Bulgaria – have stricter RF exposure limits than the US (see chart below) In January 2015, France forbade Wi-Fi in preschools and ordered it be turned off in elementary schools when not in use. In April 2016, Haifa, Israel has also removed Wi-Fi in schools. You can read more here on Schools and teacher unions around the world taking action on wireless <https://ehtrust.org/policy/schools-unions-and-pta-actions/>

In summary, there are many reasons to stop the “massive infrastructure” required for 5G at this time. The reasons:

1) NTP studies demonstrating a statistically significant increase in brain and heart cancer in rats following chronic exposure at 1.5W/kg (which is below the FCC SAR limit of 1.6W/kg) ;

- 2) reports by our own military and other branches of the US government demonstrating biological effects from RF radiation at below thermal levels;
- 3) the fact that non-thermal levels of microwave radiation are used for medical purposes because there is a biological effect;
- 4) the near 1000 submissions by doctors, scientists, and others asking the FCC to revise their limits in FCC proceeding 13-84;
- 5) the fact that the higher millimeter frequencies to be used in 5G (as well as 2G, 3G, 4G), have NEVER been studied for its long-term effect on humans by our government; and
- 6) the fact that there are enough cell tower facilities ALREADY in existence to service more than one cell phone to everyone in this country.

Any more facilities are not necessary and are not even justified by the 1996 Telecommunications Act.

The 1996 Telecommunications Act states that new cell tower facilities may be installed and pre-empt local zoning laws only when the provider can prove there is a significant gap in coverage. With 116% market penetration, there are no more significant gaps in coverage.

Cell phones are important for safety – their original intention was to provide emergency help. However, since then, they they are now used more for entertainment by adults and children alike than for safety. Now is the time for prudent caution on this issue and slow down any “massive deployment” of more cellular infrastructure that is not needed

Everything in this letter is factual. Please do the research for yourself, your families, your constituents, and for everyone in this country. 5G deployment is a serious matter. To implement 5G without thoroughly evaluating the risks to human health would be negligence.

FCC’s job is to regulate the telecom industry for the protection of this nation’s citizens, not pushing a program for private industry’s gain in the name of national priority when there are serious health risks and unknowns to consider.

Sincerely,

Angela Tsiang