

THE FCC KEEPS LETTING ME BE: WHY
RADIOFREQUENCY RADIATION STANDARDS
HAVE FAILED TO KEEP UP WITH
TECHNOLOGY

Hala Mouzaffar

ISSN 0041-9915 (print) 1942-8405 (online) • DOI 10.5195/lawreview.2021.826
<http://lawreview.law.pitt.edu>



This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License.



This site is published by the University Library System of the University of Pittsburgh as part of its D-Scribe Digital Publishing Program and is cosponsored by the University of Pittsburgh Press.

THE FCC KEEPS LETTING ME BE: WHY RADIOFREQUENCY RADIATION STANDARDS HAVE FAILED TO KEEP UP WITH TECHNOLOGY

Hala Mouzaffar*

Are you reading this on a computer? A tablet? A cellphone? Is the device using WiFi? Perhaps you have music playing through a wireless headset? Where is your cellphone right now? Is it on you? Do you carry it in your pocket all day? On a clip on your belt? How often do you have it on the table next to you? When is the last time you picked it up? Did you just reach for it? Did you think about it? Did you fall asleep last night with it next to you? Do you use it as an alarm in the morning? When is the last time you did not have it next to you? In the same room as you?

If you have any difficulty remembering the last time you were not within inches of an electronic device, you are not alone. Since the inception of wireless communication, devices of increasing technological advancement have become ingrained into the fabric of society. Wireless devices have become an extension of the human body and an integral part of everyday life for a majority of Americans and the world in general.

Regardless of whether the wireless device makes a call, sends a text, searches the internet, or shares a stream, within a moment's notice of the user initiating a

* Hala received her J.D. from the University of Pittsburgh School of Law in 2021, and has not gotten a good night's sleep since the late 90s. She would like to thank herself for typing this, herself for editing this, and herself for finishing this. Without her, this Note would not have been possible. She would like to give a special thanks to her family for listening to her talk about the Note incessantly and still willingly agreeing to read it.

command, the command transforms into a digital or electrical signal.¹ The signal is then transmitted via electromagnetic waves from the device to its corresponding destination.² The corresponding destination depends on the command issued, which can be to a cell tower or another wireless device.³ A return signal is transmitted back to the user's device in the same fashion.⁴ This transmission of signals between locations continues until the command ends.⁵ Wireless communication devices utilize a specific subcategory of electromagnetic waves, known as radiofrequency ("RF") waves.⁶ RF wave signals emitted from wireless devices are known as radiofrequency radiation ("RFR").⁷

As of 2018, an estimated five billion people worldwide have cellphones.⁸ As of 2020, Americans averaged 5.4 hours of active usage daily.⁹ When users are actively using their phone, their device is continuously emitting RFR.¹⁰ While it is somewhat frightening to imagine that the average user is being exposed to radiation for 5.4 hours a day, in actuality, the phone continues to emit the same levels of RFR for the

¹ Chris Woodford, *How Cellphones Work*, EXPLAIN THAT STUFF (July 19, 2020), <https://www.explainthatstuff.com/cellphones.html>; Lesics, *How Does Your Mobile Phone Work? | ICT #1*, YOUTUBE (Dec. 29, 2018), https://www.youtube.com/watch?v=1JZG9x_VOwA [<https://perma.cc/P22N-HTPE>].

² Woodford, *supra* note 1.

³ *Id.*

⁴ *Cellular (Cell) Phones*, AM. CANCER SOC'Y (June 1, 2020), <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/cellular-phones.html> [<https://perma.cc/75F6-Y8WL>].

⁵ Woodford, *supra* note 1.

⁶ *Cellular (Cell) Phones*, *supra* note 4.

⁷ *Id.*

⁸ Laura Silver, *Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally*, PEW RSCH. CTR. (Feb. 5, 2019), <https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/> [<https://perma.cc/HWK9-ZE9D>].

⁹ Eileen Brown, *Americans Spend Far More Time on Their Smartphones Than They Think*, ZDNET (Apr. 28, 2019), <https://www.zdnet.com/article/americans-spend-far-more-time-on-their-smartphones-than-they-think/> [<https://perma.cc/B6EM-SWKM>].

¹⁰ Simon Chandler, *How to Reduce Exposure to Cell Phone Radiation*, DIGITAL TRENDS (Mar. 26, 2021), <https://www.digitaltrends.com/mobile/reduce-exposure-cell-phone-radiation/> [<https://perma.cc/E82Y-SJ3R>]; *How to Reduce Exposure to Radiofrequency Energy from Cell Phones*, CAL. DEP'T OF PUB. HEALTH, DIV. OF ENV'T & OCCUPATIONAL DISEASE CONTROL, <https://www.cdph.ca.gov/Programs/CCDC/DEOD/CEID/CDPH%20Document%20Library/Cell-Phone-Guidance.pdf> [<https://perma.cc/5P82-U6DS>].

remaining 18.6 hours of the day unless the device is turned completely off;¹¹ wireless devices only cease producing RFR when they are completely turned off—not in standby mode with the screen locked.¹² A 2013 study found that 79% of people ages 18–44 have their phones on or are near their person for 22 hours a day.¹³ Accordingly, the majority of wireless communication device users experience constant, around-the-clock RFR exposure.

Scientists have been researching the effects of RFR since the inception of these devices. Although still not perfect, laboratory techniques have become increasingly sophisticated, and researchers have been better able to isolate and draw conclusions on the effects of RFF on the human body. While methods are not foolproof and debate still exists, data suggests that prolonged RFR exposure can potentially have detrimental health effects.¹⁴

There are two government agencies that primarily retain the regulatory authority over wireless communications devices: the Federal Communications Commission (“FCC”) and the Food and Drug Administration (“FDA”).¹⁵ In this coupled regulatory structure, the FCC sets the guidelines and certifies that manufacturers comply with them.¹⁶ With wireless devices being so commonplace, it is surprising to know that the FCC has been adamant since the beginning that they do not have the expertise to set standards; instead, they insist on referring to their stance as simply *guidelines*.¹⁷ The FDA serves more of an oversight role; they collect and provide scientific data regarding RFR and consult with other federal agencies on testing and evaluating RFR.¹⁸ The FDA can also interfere and take action if they have

¹¹ See Chandler, *supra* note 10.

¹² *Id.*

¹³ Allison Stadd, *79% of People 18–44 Have Their Smartphones With Them 22 Hours a Day [STUDY]*, ADWEEK (Apr. 2, 2013), <https://www.adweek.com/digital/smartphones/> [<https://perma.cc/CQ9N-RW32>].

¹⁴ Zahid Naeem, *Health Risks Associated with Mobile Phones Use*, 8 INT’L J. HEALTH SCIS. 5, 5 (2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4350886/> [<https://perma.cc/QA9Y-32F4>].

¹⁵ *Cell Phones*, U.S. FOOD & DRUG ADMIN. (May 13, 2021), <https://www.fda.gov/radiation-emitting-products/home-business-and-entertainment-products/cell-phones> [<https://perma.cc/87US-A74X>].

¹⁶ *Id.*

¹⁷ See Carol R. Goforth, *A Bad Call: Preemption of State and Local Authority to Regulate Wireless Communication Facilities on the Basis of Radiofrequency Emissions*, 44 N.Y.L. SCH. L. REV. 311, 360 (2001).

¹⁸ *Id.*

evidence that a particular wireless communication device emits an amount of RFR that is hazardous to the user.¹⁹ Despite the growing body of scientific evidence, and their paired authority to take action, these two agencies have refrained from acknowledging any adverse health effects; instead, they issue *guidelines* for companies to follow—those of which were last updated in 1996.²⁰

With each passing year, scientists and researchers continue to find connections between wireless devices and deleterious health effects.²¹ The vast majority of current research only measures health impacts for a limited amount of time.²² Because these products are relatively new, no research exists on their effects over the course of a person's lifetime. There is no telling what thirty, forty, or even fifty years of constant exposure could do. With cellphones physically in the hands of nearly 97% of Americans,²³ if guidelines remain at their current levels, and long-term usage of such devices proves to be as detrimental as current research suggests, wireless devices have the potential to cause one of the largest national public health threats the United States has ever seen.

Part I of this Note will provide a basic understanding of the science behind RFR and the current scientific research on how it physically impacts biological systems. Part II will look at the history of RFR regulation in the U.S. and how the FCC and FDA gained their respective roles within the regulatory framework. Finally, Part III will look to the future of wireless communication technology and explore possible solutions and pathways that the government can take to mitigate the potential health risk.

¹⁹ *Wireless Devices and Health Concerns*, FED. COMM'N COMM'N (Nov. 4, 2020), <https://www.fcc.gov/consumers/guides/wireless-devices-and-health-concerns> [<https://perma.cc/RFF9-BCF6>]. The FDA and FCC belong to the Radiofrequency Interagency Work Group, a group of six different federal agencies that review and coordinate with each other on different aspects of RF safety. The group also includes the National Institute for Occupation Safety and Health, the Environmental Protection Agency, and the Occupation Safety and Health Administration. *Id.*

²⁰ Kenneth A. Jacobsen, *A Tale of Two Circuits: Curbs on Legal Remedies for Exposure to Potentially Harmful Cell Phone Radiation*, 10 SETON HALL CIR. REV. 1, 13 (2013).

²¹ See FDA, REVIEW OF PUBLISHED LITERATURE BETWEEN 2008 AND 2018 OF RELEVANCE TO RADIOFREQUENCY RADIATION AND CANCER (2020), <https://www.fda.gov/media/135043/download> [<https://perma.cc/UN68-M4ZC>].

²² *Wireless Devices and Health Concerns*, *supra* note 19.

²³ *Mobile Fact Sheet*, PEW RSCH. CTR. (Apr. 7, 2021), <https://www.pewresearch.org/internet/fact-sheet/mobile/> [<https://perma.cc/HD62-RDS4>].

I. A CELLULAR UNDERSTANDING

“It is well established that exposure to high levels of RFR can cause adverse health effects.”²⁴ These dangers and risks are backed by science and appropriately reflected in safety standards for jobs with high RFR exposure—like for employees working in broadcasting transport and communication industries that work in close proximity to transmitting antennas and radar systems.²⁵ However, it is important to be candid that there is no consensus within the scientific community as to how RFR produced by wireless communication devices affects the human body.²⁶ For every animal or epidemiological study that points to potentially dangerous health effects, there is another that concludes the opposite.²⁷ Part of the reason for such vast inconsistencies in research in this area is that even with top-of-the-line technology, it is still difficult to control and maintain a consistent level of RFR.²⁸ Despite these limitations, “since the early 1960s, researchers have published hundreds of peer reviewed studies that, individually and collectively, raise serious and credible questions regarding RFR [produced by] cell phones and the potential health threat it poses to cell phone users.”²⁹

Nearly every device that communicates via a wireless connection in at least some capacity utilizes RFR—be it cellphones, computers, wireless headsets, televisions, or the radio.³⁰ The exact frequency the device uses varies depending on the product.³¹ For example, cellphones typically fall in the “Ultra High Frequency”

²⁴ *Pinney v. Nokia, Inc.*, 402 F.3d 430, 440 (4th Cir. 2005).

²⁵ *Radiofrequency Radiation*, AUSTL. RADIATION PROT. & NUCLEAR SAFETY AGENCY, <https://www.arpansa.gov.au/understanding-radiation/what-is-radiation/non-ionising-radiation/radiofrequency-radiation> [<https://perma.cc/AZ7C-F8P5>]; *Radiofrequency and Microwave Radiation: Standards*, U.S. DEP'T OF LAB., <https://www.osha.gov/radiofrequency-and-microwave-radiation/standards> [<https://perma.cc/49FU-EKYR>].

²⁶ *Pinney*, 402 F.3d at 440.

²⁷ FDA, *supra* note 21.

²⁸ *See generally id.*

²⁹ Jacobsen, *supra* note 20, at 20.

³⁰ *Radiofrequency (RF) Radiation*, AM. CANCER SOC'Y (June 1, 2020), <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radiofrequency-radiation.html> [<https://perma.cc/YV9L-77KS>].

³¹ *See The Electromagnetic Spectrum*, NASA: IMAGINE THE UNIVERSE (Mar. 2013), <https://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html> [<https://perma.cc/JD5M-3V82>].

category, which ranges from 300 MHz to 3000 MHz,³² whereas wireless headsets emit a frequency of about 2.4 GHz.³³ The specific frequency of the device also determines how deep the radiation penetrates the body.³⁴ The higher the frequency, the deeper the penetration.³⁵

Wireless devices communicate by emitting RFR between the product's antenna and the device it is communicating with, i.e., wireless headphones and a cellphone or a cellphone and a cell tower.³⁶ In older devices, the antenna was on the body and an obvious physical characteristic, but in modern devices, antennas are internal and out of plain sight.³⁷ The antenna is responsible for receiving and transmitting the signal.³⁸ Accordingly, it is the area of the device with the highest concentration of RFR emission.³⁹ The antenna exposes the part of our body that it is closest to with the highest concentration of radiation.⁴⁰ For example, when talking on the phone, RFR most directly affects the brain, and carrying a device in your pocket will have the greatest effect on the reproductive organs.⁴¹ The way RFR interacts with the body depends on a laundry list of factors: the distance of the device from the body, which

³² *Ultra High Frequency*, CHEMEUROPE.COM, https://www.chemeurope.com/en/encyclopedia/Ultra_high_frequency.html [<https://perma.cc/N9CK-HS9T>].

³³ Chief Editor, *Showdown of Wireless TV Headphones: RF vs IF vs Bluetooth*, HEADPHONESTY (Sept. 2, 2021), <https://www.headphonesty.com/2019/11/wireless-tv-headphones-radiofrequency-infrared-bluetooth/> [<https://perma.cc/B7VJ-CMJZ>].

³⁴ *What Are the Risks of Non-Ionising Radiation?*, INSTS. ORG. OF THE DUTCH RSCH. COUNCIL, <https://www.nwo-i.nl/en/employees/working-conditions/non-ionising-radiation/> [<https://perma.cc/UH92-LD37>].

³⁵ *See id.*

³⁶ Woodford, *supra* note 1; *Radiofrequency (RF) Radiation*, *supra* note 30; Mosa Moradi et al., *Effect of Ultra High Frequency Mobile Phone Radiation on Human Health*, 8 ELEC. PHYSICIAN 2452, 2453 (2016), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4930268/pdf/epj-08-2452.pdf>.

³⁷ Lou Frenzel, *Today's Antennas Tune into the Needs of Modern Wireless Devices*, ELEC. DESIGN (Mar. 14, 2011), <https://www.electronicdesign.com/technologies/communications/article/21792905/todays-antennas-tune-into-the-needs-of-modern-wireless-devices> [<https://perma.cc/GPB8-PQFY>].

³⁸ *Id.*

³⁹ *RF Safety FAQ*, FED. COMM'NS COMM'N, <https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety> [<https://perma.cc/Y2RM-CBKS>].

⁴⁰ *Id.*

⁴¹ *Cellular (Cell) Phones*, *supra* note 4.

part of the body it is nearest, weight, bone density, etc.⁴² These factors all play a crucial role in determining the amount of radiation the body's cells absorb.⁴³ When radiation enters the cell, it disrupts the mechanisms of the cell.⁴⁴ Once absorbed, the RFR can: cause the cell to suffer enough damage to lose function and die, cause the cell to lose the ability to reproduce, damage the cell's genetic code, or have no effect on the cell at all.⁴⁵ The rate at which a specific amount of tissue in the body absorbs RFR is known as the standard absorption rate ("SAR").⁴⁶ One of the largest concerns with cells absorbing RFR is the effect it has on cellular temperature.

Biological systems are highly temperature-sensitive. Every system is maintained at a specific homeostatic temperature to ensure efficiency and sustain life.⁴⁷ The smallest temperature increase can dramatically disrupt a cell's everyday mechanisms.⁴⁸ One degree can be the difference between a pathway working or coming to a crashing stop. When RFR is absorbed by a cell, it converts the radiation to Joule heat, thereby increasing the heat within a cell and disrupting its homeostatic temperature.⁴⁹

This temperature increase within cells can cause a slew of complications. For instance, temperature changes can cause enzymes to work at less efficient rates.⁵⁰ Enzymes are protein molecules that act as catalysts for specific biochemical

⁴² Moradi et al., *supra* note 36, at 2456.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Fact Sheet: 7. What Are the Health Effects of Ionizing Radiation?*, STATE OF NEW JERSEY DEP'T OF ENV'T PROT. (1996), <https://www.nj.gov/dep/rpp/llrw/download/fact07.pdf> [<https://perma.cc/3CGA-DARV>].

⁴⁶ *Specific Absorption Rate (SAR) for Cell Phones: What It Means for You*, FED. COMM'NS COMM'N (Oct. 15, 2019), <https://www.fcc.gov/consumers/guides/specific-absorption-rate-sar-cell-phones-what-it-means-you> [<https://perma.cc/75RR-8Y2V>].

⁴⁷ See *Homeostasis*, KHAN ACAD., <https://www.khanacademy.org/science/high-school-biology/hs-human-body-systems/hs-body-structure-and-homeostasis/a/homeostasis> [<https://perma.cc/23A8-ZPUD>] (explaining that the human body depends on temperatures being precisely within a range, if values get too high or low it can cause sickness).

⁴⁸ David H. Gultekin & Lothar Moella, *NMR Imaging of Cell Phone Radiation Absorption in Brain Tissue*, 110 PROC. NAT'L ACAD. SCI. U.S. 58, 58–59 (2012), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538231/pdf/pnas.201205598.pdf> [<https://perma.cc/E4EX-FXA6>].

⁴⁹ *Id.* at 58.

⁵⁰ *Id.*

reactions.⁵¹ When enzyme efficiency decreases, it can slow down the basic biologic pathways essential to life.⁵² If the enzymes slow down enough, the pathways will not meet the threshold of energy required to carry out its biochemical reactions, and pathways can stop all together.⁵³

A 2013 study observed that cultured brain neurons placed into a gel and exposed to low levels of RFR recorded up to a 3°C increase in cell temperature.⁵⁴ The neurons in this experiment were devoid of any protections that would be typical of a neuron, like the skull and other tissues of the body.⁵⁵ However, a temperature increase of this magnitude would be detrimental to a normal healthy neuron.⁵⁶

Another study examined how cells in the brain react when exposed to current allowable SAR levels of RFR produced by wireless communication devices.⁵⁷ The study suggested that when exposed to this magnitude of radiation for 12 minutes, brain cells typically increased in temperature by 0.11°C.⁵⁸

While these temperatures may seem minimal, these cells had very limited RFR exposure. None of these studies have examined prolonged exposure. If scientists can demonstrate this type of heating for short periods of exposure, there is no telling what they would find if they examined 24-hour daily exposure over several decades.

It has often been thought that because wireless communication devices use low levels of RFR that users are not susceptible to thermal heating and thus are safe. However, a 2019 National Toxicology report discovered similarly detrimental results for rats exposed to current SAR limits over a period of time more consistent with a

⁵¹ M.J. Farabee, *Reactions and Enzymes*, ESTRALLA MOUNTAIN, <https://www2.estrellamountain.edu/faculty/farabee/biobk/BioBookEnzym.html> [<https://perma.cc/58KK-VJU8>].

⁵² Ben Himme, *Temperature & Enzyme Activity*, PATHWAYS, <https://www.pathwayz.org/Tree/Plain/ENZYMES+-TEMPERATURE> [<https://perma.cc/28QA-PEDR>].

⁵³ Farabee, *supra* note 51.

⁵⁴ *Id.*

⁵⁵ *About the Brain and Spinal Cord*, UNIV. OF PITT. SCH. OF MED., DEP'T OF NEUROLOGICAL SURGERY, <https://www.neurosurgery.pitt.edu/centers/neurosurgical-oncology/brain-and-brain-tumors/about> [<https://perma.cc/YQV7-U64Q>].

⁵⁶ Stefan Buzatu, *The Temperature-Induced Changes in Membrane Potential*, 102 RIVISTA DI BIOLOGIA 199 (2009) (It.).

⁵⁷ Gultekin & Moella, *supra* note 48, at 58.

⁵⁸ *Id.* at 60.

typical user's usage.⁵⁹ In this 2019 report, the National Toxicology Program published a first-of-its-kind study where they exposed male rats to 2G and 3G networks (RFR) on and off for 10 minutes at a time, 18 hours a day, for a total of nine hours a day for two years.⁶⁰ This study is the closest replication to the type of exposure humans experience that has ever been done. RFR levels were at or slightly above the FCC's set limits—the variation was due to their inability to precisely control RFR levels in an experimental setting.⁶¹ At the conclusion of the study, researchers found “clear evidence of tumors in the hearts of male rats,” as well as some evidence of tumors in the brains and adrenal glands of male rats.⁶² This study garnered significant buzz, as there was previously limited knowledge about potential health effects from long-term exposure to RFR.⁶³ Not only that, but the results yielded several statistically significant outcomes.⁶⁴ While it is not conclusive that RFR produced from wireless communication devices always causes tumors, this study certainly provides evidence that it is a real possibility.

Based on the evidence, it is impossible to believe that constantly exposing the human body to RFR through wireless communication devices has absolutely no effect on them.

II. HISTORY OF ELECTROMAGNETIC RADIOFREQUENCY RADIATION REGULATION

The FCC, FDA, Environmental Protection Agency (“EPA”), National Institute for Occupational Safety and Health (“NIOSH”), and the Occupational Safety and Health Administration (“OSHA”) all play a role in “monitoring and investigating issues related to RFR exposure.”⁶⁵ The source of RFR and who it affects determines what regulatory agency's rules and regulations govern.⁶⁶ For RFR originating from

⁵⁹ Wall St. J., *Cellphone-Cancer Link Found in Government Study*, YOUTUBE (May 27, 2016), <https://www.youtube.com/watch?v=HAgFGdFkJJE> [<https://perma.cc/5B27-DZ82>].

⁶⁰ *Cell Phone Radio Frequency Radiation*, U.S. DEP'T OF HEALTH & HUMAN SERVS., <https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html> [<https://perma.cc/7SL2-K3XN>].

⁶¹ *Cell Phone Radio Frequency Radiation*, *supra* note 60; FDA, *supra* note 21 (explaining that variation is due to limitation of this type of research).

⁶² *Cell Phone Radio Frequency Radiation*, *supra* note 60.

⁶³ *Id.*

⁶⁴ *Id.*

⁶⁵ *Wireless Devices and Health Concerns*, *supra* note 19.

⁶⁶ *Id.*

wireless communication devices, regulation is primarily governed by two agencies: the FCC and the FDA.⁶⁷

A. Federal Communications Commission

The Federal Communications Act of 1934 (“FCA”) designated the FCC as the main regulatory authority on wireless communication.⁶⁸ In the 1930s, this authority reached only as far as the technology of the time.⁶⁹ As technology advanced and new forms of wireless communication devices came to fruition, the language of the FCA extended the FCC’s authority over new devices. Beginning in 1934 and the 30 years following, the FCC continually maintained the position that it lacked expertise on the interplay between radiation and its environment.⁷⁰ Accordingly, the agency refused to exercise its power and issue any formal regulations or guidelines regarding radiation emitted from wireless communication devices.⁷¹

The FCC remained silent on the topic until 1969, when Congress enacted the National Environmental Policy Act (“NEPA”), the first major environmental law in the United States.⁷² The purpose of NEPA was to “promote efforts which [would] prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man.”⁷³ Although NEPA was primarily focused the environment and made no mention of wireless communication devices, it required action on the part of the FCC.⁷⁴ In response to NEPA, the FCC finally issued guidelines “for evaluating the environmental impact of electromagnetic radiation and RF emissions.”⁷⁵

⁶⁷ *Id.*

⁶⁸ Goforth, *supra* note 17, at 332.

⁶⁹ *Id.*

⁷⁰ *Id.* at 333.

⁷¹ *Id.*

⁷² *The National Environment Policy Act of 1969*, OFF. OF NEPA POL’Y & COMPLIANCE, https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/Req-NEPA.pdf [<https://perma.cc/PYD2-M82M>].

⁷³ *Id.*

⁷⁴ *Radio Frequency Safety*, FED. COMM’N COMM’N, <https://www.fcc.gov/general/radio-frequency-safety-0> [<https://perma.cc/AYH4-9QYG>].

⁷⁵ Goforth, *supra* note 17, at 333.

Despite the FCC exercising its authority by formally adopting guidelines, it continued to maintain the position that it lacked the necessary expertise to issue any rules on RFR limits.⁷⁶ It refused to examine the science and data on its own. Instead, the FCC relied on outside agencies—primarily the American National Standards Institute (“ANSI”), a private, non-profit organization dedicated to supporting the U.S. voluntary standards and conformity assessment system.⁷⁷ The FCC relied so heavily on outside agencies and their expertise that it essentially adopted whatever standards ANSI endorsed.⁷⁸

The FCC’s first set guidelines following NEPA remained in effect until 1992, when ANSI collaborated with the Institute of Electrical and Electronic Engineers (“IEEE”) and updated its exposure guidelines with more restrictive standards.⁷⁹ These new standards created two distinctive categories of RFR, each with different limits: “controlled environments” and “uncontrolled environments.”⁸⁰ Controlled environments were where a high RFR exposure was typical during the course of their work day.⁸¹ Uncontrolled environments described what the general public would encounter on a day-to-day basis.⁸² For uncontrolled environments, ANSI/IEEE C95.1-1992 set the SAR at 1.6 W/kg averaged over 1 gram of tissue.⁸³

The following year, the FCC initiated formal notice and comment rulemaking procedures to adopt the new combination ANSI/IEEE standards.⁸⁴ In the midst of the comment process, Congress enacted the Telecommunications Act of 1996 (“TCA”), which amended the FCA.⁸⁵ The TCA directed the FCC to complete rulemaking proceedings and “have revised RFR exposure guidelines in place by August 7,

⁷⁶ *Id.* at 382.

⁷⁷ *About ANSI*, AM. NAT’L STANDARDS INST., <https://www.ansi.org/about/introduction> [<https://perma.cc/4D8T-DDMW>]; Goforth, *supra* note 17, at 333.

⁷⁸ Goforth, *supra* note 17, at 333.

⁷⁹ *Id.*

⁸⁰ *Id.* at 334.

⁸¹ *Id.*

⁸² *Id.*

⁸³ Jacobsen, *supra* note 20, at 8.

⁸⁴ *Id.* at 26.

⁸⁵ *Id.*

1996.”⁸⁶ By August of 1996, the FCC complied and adopted ANSI/IEEE’s uncontrolled environment 1.6W/kg standard “for devices operating within close proximity to the body.”⁸⁷ The new “1996 regulations specifically indicated their application to ‘portable devices’ such as cell phones.”⁸⁸ Again, despite updated guidelines, the FCC still refused to acknowledge itself as having any expertise on RFR and continued to refer to their standards as only *guidelines*.⁸⁹

Since the guidelines were updated in 1996, ANSI, the International Commission on Non-Ionizing Radiation Protection (“ICNIRP”), and National Council on Radiation Protection (“NCRP”) have all issued updated versions of their standards, indicating that for the general public, a whole-body SAR should possibly be as low as 0.08 W/kg.⁹⁰ In fact, since the 1996 guidelines, ANSI and IEEE have issued multiple revisions and updates to their suggested SAR values, the last of these updates occurring in October of 2019.⁹¹ However, the FCC still has the original 1996 guidelines in effect today.⁹²

On March 27, 2013, the FCC voted to advance a new measure that would review several rules pertaining to NEPA.⁹³ Within this new measure, one fold of the plan designated a *Notice of Inquiry*, which “request[ed] comment to determine whether its RF exposure limits and policies need to be reassessed.”⁹⁴ The FCC implemented this procedure to determine whether the current RFR rules and policies

⁸⁶ Goforth, *supra* note 17, at 334.

⁸⁷ *Radio Frequency Safety*, *supra* note 74.

⁸⁸ Jacobsen, *supra* note 20, at 28.

⁸⁹ *Id.*

⁹⁰ 47 C.F.R. § 1.1310 (2020); Int’l Comm’n on Non-Ionizing Radiation Prot., *ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz)*, 74 HEALTH PHYSICS 494 (1998), <https://web.archive.org/web/20140606044606/http://www.icnirp.org/documents/emfgdl.pdf> [<https://perma.cc/HG5H-NTN4>]; NAT’L COUNCIL ON RADIATION PROT. & MEASUREMENTS, REPORT NO. 067—RADIOFREQUENCY ELECTROMAGNETIC FIELDS—PROPERTIES, QUANTITIES AND UNITS, BIOPHYSICAL INTERACTION, AND MEASUREMENTS (1981).

⁹¹ *IEEE C95.1-2019—IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 Hz*, IEEE STANDARDS ASS’N, https://standards.ieee.org/standard/C95_1-2019.html [<https://perma.cc/3MLL-CXMJ>].

⁹² *Radio Frequency Safety*, *supra* note 74.

⁹³ *Id.*

⁹⁴ *Id.*

should remain unchanged, relaxed, or tightened “in light of more recent developments.”⁹⁵

The 2013 investigation remained open until December 2019, when the FCC finally adopted new provisions that addressed these issues that had been pending for nearly seven years.⁹⁶ Much to the disappointment of advocates, the FCC indicated that RFR limits were to remain unchanged.⁹⁷ The report indicated that the FCC found “no appropriate basis for and thus decline[d] to propose amendments to [its] existing limits at this time.”⁹⁸ In its release, the FCC stated, “we believe [current RF guidelines] reflect the best available information concerning safe levels of RFR exposure for workers and members of the general public”⁹⁹ As described in the *National Law Review*, “the FCC declined to revisit its RFR exposure evaluation procedures for consumer portable devices, especially phones, [and] declined to revisit its RFR exposure policy as it pertains to children”¹⁰⁰ The report’s results seemed indicative of an agency that was confident that its 23-year-old guidelines were still applicable and could keep users safe from RFR emitted from wireless communication devices.

However, days after the 2019 report was published, the FCC proposed new rules to address:

the challenges of evolving technology. It propose[d] to expand the range of frequencies for which the RF exposure limits apply (currently 100kHz to 100 GHz) to a new upper limit of 3000 GHz; to reduce the spatial averaging area of the human body from the current 20 cm² to 1 cm² for higher frequencies; to establish a new “device-based time-averaging” and [sought] comments on

⁹⁵ *Id.*

⁹⁶ Michael T.N. Fitch, *Old Limits and New Procedures for FCC RF Exposure Rules*, LEXBLOG: BEYOND TELECOM L. BLOG (Jan. 23, 2020), <https://www.lexblog.com/2020/01/23/old-limits-and-new-procedures-for-fcc-rf-exposure-rules/> [<https://perma.cc/UH22-JWFQ>].

⁹⁷ *Id.*

⁹⁸ FCC, RESOLUTION OF NOTICE OF INQUIRY, SECOND REPORT AND ORDER, NOTICE OF PROPOSED RULEMAKING, AND MEMORANDUM OPINION AND ORDER 2 (Dec. 4, 2019), <https://docs.fcc.gov/public/attachments/FCC-19-126A1.pdf> [<https://perma.cc/3VZ7-CFR2>].

⁹⁹ *Id.*

¹⁰⁰ Fitch, *supra* note 96.

whether and how to apply it to ensure compliance with the RF exposure rules¹⁰¹

The proposed rules seemed to contradict the FCC's stance in its report that current guidelines were safe. The new rules appeared to highlight key issues that the FCC must have uncovered in its review and proposed new guidelines better equipped for more modern-day products and user usage.

B. Food & Drug Administration

In 1938 the Federal Food, Drug, and Cosmetic (FD&C) Act and Public Health Service Act were passed, granting the FDA the power to regulate medical products that emitted radiation.¹⁰² However, as radiation surpassed medicine and became more commonplace in everyday life, Congress recognized the need for regulation in that realm as well. Congress declared that “the public health and safety must be protected from the dangers of electronic product radiation.”¹⁰³ In doing so, Congress passed the 1968 Radiation Control for Health and Safety Act (“RCHSA”).¹⁰⁴ The act's purpose was to create performance standards for radiation-emitting products and minimize exposure to electronic radiation from products that are common to everyday life.¹⁰⁵ However, with the passage of the Safe Medical Device Amendments of 1990, Congress recodified the RCHSA to Title 21, authorizing the electronic product radiation control provision to the FD&C Act.¹⁰⁶

Under the FD&C Act, Congress directs the FDA to prescribe “performance standards for electronic products; . . . to minimize the emissions of and the exposure of people to, unnecessary electronic product radiation” so as to “carry out an electronic product radiation control program designed to protect the public health

¹⁰¹ *Id.*

¹⁰² *Federal Food, Drug, and Cosmetic Act (FD&C Act)*, U.S. FOOD & DRUG ADMIN. (Mar. 29, 2018), <https://www.fda.gov/regulatory-information/laws-enforced-fda/federal-food-drug-and-cosmetic-act-fdc-act> [<https://perma.cc/D69Y-G9CH>].

¹⁰³ Radiation Control for Health and Safety Act of 1968, Pub. L. No. 90-602, § 42, 82 Stat. 1173–1174.

¹⁰⁴ *Id.* at 1173–1187.

¹⁰⁵ *A History of Medical Device Regulation & Oversight in the United States*, U.S. FOOD & DRUG ADMIN. (June 24, 2019), <https://www.fda.gov/medical-devices/overview-device-regulation/history-medical-device-regulation-oversight-united-states> [<https://perma.cc/HZX7-VKGP>].

¹⁰⁶ Safe Medical Devices Act of 1990, Pub. L. No. 101-629, § 19, 104 Stat. 4511, 4529–4530 (1990), <https://www.govinfo.gov/content/pkg/STATUTE-104/pdf/STATUTE-104-Pg4511.pdf> [<https://perma.cc/MB38-SL4T>].

and safety from electronic product radiation”¹⁰⁷ Codified in 21 USC § 360ii(b)(1), the language of the act required the FDA to collect, analyze, and make “available, through publications and other appropriate means, the results of, and other information concerning, research and studies relating to the nature and extent of the hazards and control of electronic product radiation; and make such recommendations relating to such hazards and control” as considered appropriate.¹⁰⁸

Currently, the FDA’s official website states that it believes “that the weight of scientific evidence has not linked exposure to radio frequency energy from cell phone use with *any* health problems at or below the radio frequency exposure limits set by the FCC.”¹⁰⁹ It believes there is absolutely no public health or scientific data to support even the tiniest association between RFR discharged from wireless communication devices and adverse health issues.¹¹⁰ To date, the FDA has taken no affirmative actions to intervene in RFR produced by wireless communication devices. Interestingly enough, though, the FDA acknowledges that RFR does cause tissue heating.¹¹¹ As discussed earlier, tissue heating, can be detrimental to cells if sustained for a prolonged period of time and can be a precursor to other issues.¹¹²

Among other things, the FDA also acknowledges a list of several national and international organizations like the National Cancer Institute (NCI), World Health Organization (WHO), and National Toxicology Program (NTP), whose research and classifications it considers when establishing its own guidelines.¹¹³ Despite their admitted partial reliance on such organizations, the FDA’s view of RFR is in juxtaposition with many of them. The NCI and WHO both cite cellular device radiation as a possible carcinogen.¹¹⁴ Additionally, the NTP found what they believe

¹⁰⁷ 21 U.S.C. § 360ii(a).

¹⁰⁸ *Id.* at § 360ii(b)(1).

¹⁰⁹ *Do Cell Phones Pose a Health Hazard?*, U.S. FOOD & DRUG ADMIN. (Feb. 10, 2020), <https://www.fda.gov/radiation-emitting-products/cell-phones/do-cell-phones-pose-health-hazard> [<https://perma.cc/263K-Z7N8>] (emphasis added).

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² Gultekin & Moella, *supra* note 48, at 58–59.

¹¹³ *See Scientific Evidence for Cell Phone Safety*, U.S. FOOD & DRUG ADMIN. (Feb. 10, 2020), <https://www.fda.gov/radiation-emitting-products/cell-phones/scientific-evidence-cell-phone-safety> [<https://perma.cc/S2K7-P72Y>].

¹¹⁴ *Cell Phones and Cancer Risk*, NAT’L CANCER INST. (May 14, 2021), <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet> [<https://perma.cc/3KMP-HSYQ>].

to be clear evidence of tumor growth following exposure to RFR after publishing a decade-long series of toxicology studies in 2018¹¹⁵—the FDA refuses to accept their conclusions because they claim it is outdated.¹¹⁶

In February 2020, the FDA released a report examining relevant *in vivo* and epidemiological studies investigating RFR's association with cancer.¹¹⁷ *In vivo* studies examine biological entities.¹¹⁸ They are studies conducted on “the whole, living organism.”¹¹⁹ These studies frequently involve animals and have been instrumental in making advances in modern medicine. According to the NICD, “the types of animals used in research are chosen for their similarity to humans in anatomy, physiology, and/or genetics.”¹²⁰ By using animals, researchers can learn how to “prevent, treat, and cure human diseases.”¹²¹ Essentially, *in vivo* studies are a gold standard in science. They are as close as researchers can get to the human body without conducting experiments on humans.¹²² However, in its 2020 Report, the FDA indicated that while *in vivo* studies contribute to the understanding of the potential effects of RFR, these studies contain critical limitations and thus cannot be used to “draw conclusions about the impact of such exposure to humans.”¹²³ The

¹¹⁵ News Release, Nat'l Inst. of Env't Health Scis., High Exposure to Radiofrequency Radiation Linked to Tumor Activity in Male Rats (Feb. 2, 2018), <https://www.niehs.nih.gov/news/newsroom/releases/2018/february2/index.cfm> [https://perma.cc/3QYW-CYNZ].

¹¹⁶ News Release, FDA, Statement from Jeffrey Shuren, M.D., J.D., Director of the FDA's Center for Devices and Radiological Health on the Recent National Toxicology Program Draft Report on Radiofrequency Energy Exposure (Feb. 2, 2018), <https://www.fda.gov/news-events/press-announcements/statement-jeffrey-shuren-md-jd-director-fdas-center-devices-and-radiological-health-recent-national> [https://perma.cc/BD6D-DHBZ].

¹¹⁷ FDA, *supra* note 21.

¹¹⁸ Jill Seladi-Schulman, *In Vivo vs. In Vitro: What Does It All Mean?*, HEALTHLINE (Aug. 19, 2019), <https://www.healthline.com/health/in-vivo-vs-in-vitro> [https://perma.cc/56MZ-H5CF].

¹¹⁹ *Id.*

¹²⁰ *The Important Role of Animals in Research at NIDCD*, NAT'L INST. ON DEAFNESS & OTHER COMMUN DISORDERS (Sept. 14, 2012), <https://www.nidcd.nih.gov/news/important-role-animals-research-nidcd-2012> [https://perma.cc/Y3TE-HDUN].

¹²¹ *Id.*

¹²² *Id.*

¹²³ FDA, *supra* note 21, at 34.

FDA refused to apply the results of all thirty-seven peer-reviewed articles relating to *in vivo* studies examining human cell phone usage.¹²⁴

Contrarily, the FDA concluded that the epidemiological studies supported its “findings that there is no quantifiable causal link between RFR exposure and tumor formation.”¹²⁵ It placed heavy reliance on the epidemiological studies it examined.¹²⁶

[E]xisting epidemiologic evidence is insufficient to suggest that use of cell phones can be considered as an independent etiological factor capable of influencing the incidence of intracranial and some other tumors in the general population. Existing epidemiological evidence indicates that if any risk does exist, it is extremely low compared to both the natural incidence of the disease and known controllable risk factors.¹²⁷

Historically, epidemiological studies have been viewed as tending “to produce less reliable data that can be more difficult to interpret.”¹²⁸ “For instance, it is extremely rare that an epidemiology study alone can confirm that a particular chemical exposure caused a health effect.”¹²⁹

So, while *in vivo* studies have been used for centuries and lauded for their influence on science and modern medicine and epidemiological studies show no more than a correlation unless backed by scientific studies, the FDA forwent accepted views on them. And while the FDA believed that its position was fully supported and that no further action was required, it promised to “continue to monitor available information.”¹³⁰

¹²⁴ *Id.*

¹²⁵ *Id.* at 87.

¹²⁶ *Id.*

¹²⁷ *Id.*

¹²⁸ *Are Epidemiology Studies Good Tools for Evaluating Chemical Safety?*, CHEMICAL SAFETY FACTS, <https://www.chemicalsafetyfacts.org/are-epidemiology-studies-good-tools-for-evaluating-chemical-safety/> [<https://perma.cc/5VKS-DTC2>].

¹²⁹ *Id.*

¹³⁰ FDA, *supra* note 21, at 87.

C. *International Organizations*

RFR is not just a national issue. International organizations have closely monitored the evolution of research in this area. The World Health Organization funds the International Agency for Research on Cancer (“IARC”) that identifies “environmental factors that can increase the risk of cancer in humans.”¹³¹ The agency conducts both epidemiological as well as laboratory research into the causes of human cancer.¹³² The agency classifies agents on the following scale:

- Group 1: Carcinogenic to Humans.
- Group 2A: Probably Carcinogenic to Humans.
- Group 2B: Possibly Carcinogenic to Humans.
- Group 3: Not Classifiable as to its Carcinogenicity to Humans.
- Group 4: Probably not Carcinogenic to Humans.¹³³

An agent is categorized based on the level of evidence IARC believes to be present in the scientific community.¹³⁴ IARC classifies radiofrequency fields as a “Group 2B: Possibly Carcinogenic to Humans” agent.¹³⁵ IARC interprets the 2B classification to mean there is limited evidence showing radiofrequency carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental humans.¹³⁶ Other agents like lead, chloroform, and talc-based body

¹³¹ *Scientific Evidence for Cell Phone Safety*, U.S. FOOD & DRUG ADMIN. (Feb. 10, 2020), <https://www.fda.gov/radiation-emitting-products/cell-phones/scientific-evidence-cell-phone-safety> [<https://perma.cc/6XTF-XDAW>].

¹³² *IARC—International Agency for Research on Cancer*, WORLD HEALTH ORG., https://www.who.int/ionizing_radiation/research/iarc/en/ [<https://perma.cc/R3V5-HHTS>].

¹³³ Int’l Agency for Rsch. on Cancer, *Agents Classified by the IARC Monographs, Volumes 1–129*, WORLD HEALTH ORG. (July 22, 2021), <https://monographs.iarc.who.int/agents-classified-by-the-iarc/> [<https://perma.cc/P573-BJ97>].

¹³⁴ Int’l Agency for Rsch. on Cancer, *IARC Monographs on the Identification of Carcinogenic Hazards to Humans: Questions and Answers*, WORLD HEALTH ORG. (Dec. 10, 2019), https://monographs.iarc.who.int/wp-content/uploads/2018/07/QA_ENG.pdf [<https://perma.cc/F9YU-KSG7>].

¹³⁵ Press Release, Int’l Agency for Rsch. on Cancer, *IARC Classifies Radiofrequency Electromagnetic Field as Possibly Carcinogenic to Humans*, WORLD HEALTH ORG. (May 31, 2011), https://www.iarc.who.int/wp-content/uploads/2018/07/pr208_E.pdf [<https://perma.cc/N7WV-MSNB>].

¹³⁶ *Id.*

powder are also in the 2B classification.¹³⁷ Since their classification, lead, chloroform, and talc-based body powders all were heavily investigated and subsequently linked to cancer.¹³⁸ Talc-based baby powder, in particular, has been at the center of several multi-million dollar lawsuits for its connection to ovarian cancer.¹³⁹ In 2011, IARC classified RFR as a 2B carcinogenic.¹⁴⁰ It has been more than a decade, and, in that time, there have been significant strides in research. It is unclear how IARC revisits these classifications, but recent conclusions of several monumental studies on the effects of RFR on humans could result in a re-classification of RFR to a higher group.

III. LOOKING FORWARD

As of February 2020, it appears that the FCC and FDA do not currently intend to take any additional action by revising RFR guidelines, nor does it appear they intend to acknowledge any dangers posed by wireless communication devices.

Technology advances at a staggering rate, and American law has always managed to be two steps behind. The concern is that once the government does act, devices will be already be bigger, badder, and stronger, emitting higher frequencies of RFR, and its action could be too late. Since 1996 we have had the same regulations. Today we have devices that far exceed what seemed possible in the 1990s. There are wireless headsets, smart watches, tablets, etc., and we use these devices more than ever before. Thirteen percent of millennials and five percent of baby boomers spend over twelve hours actively on their phones per day.¹⁴¹ It is no longer 1996 when the occasional person had a cellphone in case of an emergency. Cellphones and other wireless communication devices are not a novel possession. In

¹³⁷ Int'l Agency for Resch. on Cancer, *Agents Classified by the IARC Monographs, Volumes 1-129*, WORLD HEALTH ORG. (July 22, 2021, 2:00 PM), <https://monographs.iarc.who.int/list-of-classifications> [<https://perma.cc/CF63-XXFZ>].

¹³⁸ Kyle Steenland & Paolo Boffetta, *Lead and Cancer in Humans: Where Are We Now?*, 38 AM. J. INDUS. MED. 295, 296 (2000); *Chloroform-ToxFAQs*, AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY (July 2014), <https://www.atsdr.cdc.gov/toxfaqs/tfacts6.pdf> [<https://perma.cc/BL2Z-SEAA>]; Daniel King, *Johnson & Johnson*, MESOTHELIOMA CTR. (Aug. 30, 2021), <https://www.asbestos.com/companies/johnson-johnson/> [<https://perma.cc/3KZE-38GP>]; *Talcum Powder and Cancer*, AM. CANCER SOC'Y (Feb. 4, 2020), <https://www.cancer.org/cancer/cancer-causes/talcum-powder-and-cancer.html> [<https://perma.cc/W7EF-US8D>].

¹³⁹ King, *supra* note 138.

¹⁴⁰ Press Release, WORLD HEALTH ORG.: INT'L AGENCY FOR RSCH. ON CANCER (May 31, 2011), https://www.iarc.who.int/wp-content/uploads/2018/07/pr208_E.pdf [<https://perma.cc/WVB4-LCP8>].

¹⁴¹ Brown, *supra* note 9.

2020 kindergarteners have cell phones, teens keep AirPods in their ears for hours on end each day, and people walk around with smartwatches on their wrists. But still, the FCC and FDA believe that U.S. citizens are safe under the guidelines established over two decades ago.

Take, for instance, budding 5G networks across the country. Certain networks have targeted higher frequency bands for 5G than have been used in previous generations.¹⁴² There is minimal research on the current frequencies used and little to none on these higher frequencies; we already do not have a clear picture of either of their effects on the body because of the lack of research. Additionally, 5G travels on what are known as millimeter wavelengths.¹⁴³ These wavelengths have a more difficult time traveling long distances and passing through barriers.¹⁴⁴ 5G networks are likely to require “up to five times the amount of infrastructure as 3G or 4G deployments.”¹⁴⁵ Accordingly, there will need to be more towers than ever before, closer to people;¹⁴⁶ we could see these towers popping up in neighborhoods and shopping centers. 5G networks have the potential to increase the basic baseline exposure users experience on the day-to-day. This is something that has not been researched before and something current laws are not prepared to handle.

If agencies choose not to act now, then by the time the next technology or the technology after that comes, it will be too late. Technology is not going anywhere. It is only going to get more advanced and widespread in use. To solve this problem, we must address it, and there are two avenues that the government can take: inform or edit.

A. *Inform*

First and foremost, the agency regulating a specific area needs to be the one most informed and capable of regulating the issue. Federal agencies “require close oversight or specialized expertise.”¹⁴⁷ For that reason, the FCC, an organization that

¹⁴² Marguerite Reardon, *Is 5G Making You Sick? Probably Not*, CNET (July 30, 2020, 5:00 AM), <https://www.cnet.com/news/is-5g-making-you-sick-probably-not/> [https://perma.cc/ME2A-YU8R].

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ Will Kenton, *What Is a Federal Agency?*, INVESTOPEDIA (Aug. 16, 2021), <https://www.investopedia.com/terms/f/federal-agencies.asp> [https://perma.cc/9DGB-XVBE].

has repeatedly admonished that it has no business in the regulation of RFR due to its lack of knowledge,¹⁴⁸ should have no authority on the matter. The FDA should have sole regulatory power over RFR as it is a public health concern.

Whichever agency retains control needs to make updated data and guidelines accessible and known to the public at large in an easily available format for consumers. Although the majority of manufacturers include their SAR levels within their products' internal settings or in manuals, the information is often hidden or misrepresented.¹⁴⁹

For instance, to determine the SAR of a particular product on your phone, it will likely be in the "Legal" section in "General" or "About my Phone."¹⁵⁰ For iPhone users, it can be found under Settings > General > Legal > RF Exposure.¹⁵¹ Users then have to click on the provided link, which takes them to a webpage that gives both the 1.6W/kg guideline and the SAR of their specific device.¹⁵² However, the provided SAR values are useless. Although there is no mention of it, companies use a model known as the Standard Anthropomorphic Man ("SAM") to determine how much radiation is absorbed to cite these SAR values.¹⁵³ The model, SAM, is 6'2", weighs 200 lbs., and has a head that weighs 11 lbs.,¹⁵⁴ whereas the average man in North America is 5'9" and weighs 197 lbs., and ¹⁵⁵ the average woman is only 5'4" and weighs 170 lbs.; they do not consider children either.¹⁵⁶ The SAM model is

¹⁴⁸ Goforth, *supra* note 17, at 333.

¹⁴⁹ See CBC News, *Disconnect—Cell Phones—By Devra Davis*, YOUTUBE (Sept. 27, 2010), <https://www.youtube.com/watch?v=Xtd-y2C9IH4> [<https://perma.cc/TJX7-CLEE>] (recording of a clip from a CBC News about Devra Davis's book, *Disconnect: The Truth About Cell Phone Radiation, What the Industry Has Done to Hide it, and How to Protect Your Family*).

¹⁵⁰ Christian, *7 Ways to Check the SAR Value of Any Phone*, EMF ACADEMY, <https://emfacademy.com/check-sar-value-mobile-phone/> [<https://perma.cc/Z5MH-868P>].

¹⁵¹ *Id.*

¹⁵² *iPhone XR RF Exposure Information*, APPLE, <https://www.apple.com/legal/rfexposure/iphone11,8/en/> [<https://perma.cc/CUN8-2RJ5>].

¹⁵³ *Disconnect—Cell Phones—by Devra Davis*, *supra* note 149.

¹⁵⁴ *Id.*

¹⁵⁵ Cheryl D. Fryar et al., *Mean Body Weight, Height, Waist Circumference, and Body Mass Index Among Adults: United States, 1999–2000 Through 2015–2016*, 122 NAT'L HEALTH STATS. REPS. 1, 3 (2018), <https://www.cdc.gov/nchs/data/nhsr/nhsr122-508.pdf> [<https://perma.cc/9NJ7-9ND3>].

¹⁵⁶ *Id.*

not the average for any sex or age.¹⁵⁷ The values companies give are useless and deceptive. The average user will absorb more radiation than the presented SARs listed because the average user is nothing like SAM.¹⁵⁸

A solution to this problem would be to present SAR values differently. Values should be measured and represented based on the average build of a man and woman in the United States. Ideally, though, each product would be accompanied by a chart at purchase—like a body mass index chart—arranged by height and weight, where consumers could see how much RFR their particular body would absorb. This would not only better inform and protect adult users, but it would allow parents to better understand how a child’s size affects their absorption of RFR.

Moreover, all devices should present the potential harm RFR can cause in a standardized way. When the public finally became aware that cigarette smoking was harmful and could lead to cancer, Congress made strides to make the information known.¹⁵⁹ In 1969 it passed the Public Health Cigarette Smoking Act that mandated the now well-known Surgeon General’s warnings on the packaging of all tobaccos products as of November 1, 1970.¹⁶⁰ The original warning read: “WARNING: THE SURGEON GENERAL HAS DETERMINED THAT CIGARETTE SMOKING IS DANGEROUS TO YOUR HEALTH.”¹⁶¹ The warning has since been updated, but since it has been affixed to cigarette boxes, smoking rates have dropped by as much as an estimated fifty-nine percent.¹⁶² In a sense, the purpose of the warnings is to dissuade individuals from using these products, but it could also serve a higher purpose—consumer awareness. A warning of this type informs users that qualified individuals believe there is at least some degree of credible risk to their health by using these products.

I propose a similar approach for wireless communication devices. All manufacturers should be required to attach a label to RFR-utilizing devices

¹⁵⁷ *Disconnect—Cell Phones—by Devra Davis*, *supra* note 149.

¹⁵⁸ *Id.*

¹⁵⁹ See *Making Decisions Regarding Tobacco Use*, R.J. REYNOLDS TOBACCO CO., <https://rjrt.com/tobacco-use-health/public-health-information/> [<https://perma.cc/M8PF-6JPL>].

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² Liz Szabo, *U.S. Smoking Warning Made History, Saved Lives*, USA TODAY (Jan. 8, 2014, 7:36 AM), <https://www.usatoday.com/story/news/nation/2014/01/07/surgeon-general-report-made-history-saved-lives/4355275/> [<https://perma.cc/MP6R-XPDN>].

informing consumers that currently there is some credible evidence to indicate that prolonged exposure to low levels of RFR can be dangerous to consumers' health. The FCC already requires workplaces to label areas with high RFR exposure.¹⁶³ It is reasonable for them to extend this rule to products that consumers use and are around longer than an 8-hour shift at work. If thousands of workers deserve a warning, then so do the millions of cellphone users. Because of our increased reliance and dependence on such devices, a warning would by no means lead to a drastic reduction in the purchase or usage of these products. Still, it will lead to safer practices when using such devices, including monitoring and limiting use for young children, keeping devices farther away from the body on a regular basis, and not sleeping with the devices by the head. This is not a novel idea; France, Israel, India, Belgium, Russia, and Korea all require cellphones to display their SAR values on the device or packaging at the point of sale.¹⁶⁴

Additionally, industries respond to consumers. Having well-informed consumers and a warning label could lead to the development of devices that help minimize the body's absorption of RFR as well as push manufacturers to develop devices that emit less radiation. If we increase public awareness, the industry will attempt to rid itself of what the buyer wants to avoid.

There is no loss in educating the public. The worst consequence is creating a better-informed society that is more prepared to protect their own health.

B. EDIT

Another obvious remedy is reevaluating the currently available scientific information and creating stricter standards that actually protect users. However, given the 2019 and 2020 reports from the FCC and FDA, it seems unlikely they will change their stance; both agencies need to reevaluate the steps they have taken. Given the evidence at hand, it is shocking that these two agencies do not want to take *any* additional steps to reduce cellphone radiation given the evidence at hand. Other nations across the world have already stepped up and acknowledged they want to do better where RFR is concerned. France, Belgium, Switzerland, French Polynesia, Finland, Ireland, Germany, Greece, Israel, Turkey, Singapore, United Kingdom,

¹⁶³ Fitch, *supra* note 96.

¹⁶⁴ PAUL BEN ISHAI ET AL., PROPOSED FCC CHANGES TO MEASURING AND EVALUATING HUMAN EXPOSURE TO RADIOFREQUENCY ELECTROMAGNETIC FIELDS AND WIRELESS POWER TRANSFER DEVICES ARE FLAWED: NEED FOR BIOLOGICALLY-BASED STANDARDS app. 2 (2020), https://ecfsapi.fcc.gov/file/1061621406508/Appendix%20II_%20Worldwide%20Action%20on%20Cell%20Phones%20%20Wi-Fi%20and%20Wireless%20Radiation.pdf [<https://perma.cc/D2TP-SJSC>].

Russia, Denmark, India, Australia, Austria, Cyprus, Canada, Italy, Korea, Sri Lanka, Croatia, Krakow Poland all advise on reducing cellphone radiation.¹⁶⁵ Additionally, Canada, Russia, Israel, China, and Turkey have stricter national RFR limits than the United States.¹⁶⁶ RFR regulation is yet another area where the United States is not keeping up with other countries.

The new SAR guidelines issued by the FCC should also consider the person using the particular device. Guidelines should be stricter and more rigid for children because children have not yet fully developed and are more susceptible to the effects of RFR.¹⁶⁷ Other countries have already acknowledged the disparate impact RFR can have on children. Both Belgium and France have banned the sale of phones designed for children,¹⁶⁸ and France, Belgium, French Polynesia, Russia, and Turkey have banned marketing phones to children.¹⁶⁹ The United States should follow suit.

The FDA should reexamine their 10-year comprehensive plan to address these issues specifically, but this time considering *in vivo* experiments. Science does not currently have the capabilities to conduct the kind of pointed research that the FDA indicated it would need in order to consider these studies and apply the conclusions to humans.¹⁷⁰ *In vivo* studies provide us with the most accurate information we can produce aside from conducting experiments on humans.¹⁷¹ For the FDA to completely disregard these studies is essentially selecting results to fit their agenda. Even if the 2019 National Toxicology Program's experiment had significant errors, as the FDA indicated, their data still showed a dispositive propensity of RFR to cause tumors, and dozens of other studies have shown the same.¹⁷² Instead of trying to

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ See Leeka Kheifets et al., *The Sensitivity of Children to Electromagnetic Fields*, 116 PEDIATRICS 303, 303 (2005), <https://pediatrics.aappublications.org/content/116/2/e303> [<https://perma.cc/WHP5-UH5F>].

¹⁶⁸ ISHAI ET AL., *supra* note 164, app. 2, at 3.

¹⁶⁹ *Id.*

¹⁷⁰ FDA, *supra* note 21, at 87.

¹⁷¹ See generally Sarah Moore, *In Vitro vs In Vivo Preclinical Studies*, NEWS MEDICAL (Feb. 23, 2021), <https://www.news-medical.net/life-sciences/In-Vitro-vs-In-Vivo-Preclinical-Studies.aspx> [<https://perma.cc/352Z-SCJ3>].

¹⁷² *Cell Phone Radio Frequency Radiation*, *supra* note 60.

apply these results to humans or recognizing that there is at least some degree of risk, the FDA completely wrote off the experiments as inapplicable.¹⁷³

Additionally, the FDA should consider the viewpoints and determinations of other credible national and international organizations that they claim on their website to rely on for scientific expertise. Although many of these cited institutions believe RFR can potentially cause cancer, the FDA still believes there is absolutely no risk.

IV. CONCLUSION

The FCC and FDA have failed in their obligation to prescribe safe RFR guidelines produced from wireless communication devices to protect the public health and safety. Devices are becoming more sophisticated, and their usage is as common to daily life as brushing your teeth. With each passing day, this problem is left unaddressed, air is being blown into a bubble that is one day going to burst and could leave us with one of the largest public health crises that the world has ever seen. Negligence has a price, and the result of this is one that every one of the five billion cellphone users will have to pay—even the people making the laws.¹⁷⁴ *Where is your cellphone now?*

¹⁷³ FDA, *supra* note 21, at 34.

¹⁷⁴ Silver, *supra* note 8.

