

A Small Sampling of the *Numerous* Scientific Research Studies Published After December 4, 2019- The Day the FCC Closed Their Inquiry on Human Exposure to Radiofrequency Radiation (RFR).

The Environmental Working Group published a study in *Environmental Health* analyzing the findings of tumor and heart damage from the National Toxicology Program study and concluded that FCC limits should be strengthened by 200 to 400 times to protect children according to current risk assessment guidelines ([Uche 2021](#)). A [2021 study](#) on RFR and the brain published in the International Journal of Radiation Biology found the threshold for an effect in EEG is more than a 1,000 times lower than level deemed safe by the U.S. FCC ([Hinrikus et al. 2021](#)).

European Parliament requested a research report "[Health Impact of 5G](#)" released in July 2021 concluding that commonly used RFR frequencies (450 to 6000 MHz) are probably carcinogenic for humans *and* clearly affect male fertility with possible adverse effects on the development of embryos, fetuses and newborns.

A landmark three part **2021 research review** on effects to wildlife published in *Reviews on Environmental Health* by U.S experts including former U.S. Fish and Wildlife senior biologist Albert Manville states current science should trigger urgent regulatory action citing more than 1,200 scientific references which found adverse biological effects to wildlife from even very low intensities of non ionizing radiation with findings of impacts to orientation and migration, reproduction, mating, nest, den building and survivorship ([Levitt et al., 2021a](#), [Levitt et al., 2021b](#), [Levitt et al., 2021c](#)).

- **February 2020-** Scientists of the National Institute of Environmental Health Sciences National Toxicology Program published a study finding "significant increases in DNA damage" in groups of male mice, female mice and male rats after just 14 to 19 weeks of exposure to RFR ([Smith-Roe et al., 2020](#)).
- **March 2020-** Yale researchers published a study supported by the American Cancer Society linking thyroid cancer to cell phone use in people with a type of common genetic variation ([Luo et al., 2020](#)).
- **May 2020-** A meta analysis of 300 peer-reviewed scientific publications (1990-2015) describing 1127 experimental observations in cell-based in vitro models on RFR published in *Environmental Research* found less differentiated cells such as epithelium and spermatozoa are more sensitive to RF ([Halgamuge et al., 2020](#)).
- **May 2020-** A review on real world exposure to 5G published in *Toxicology Letters* found that 5 G will have systematic effects as well as adverse effects to the skin and eyes ([Kostoff et al., 2020](#)).
- **November 2020-** A systematic review and meta-analysis of case-control studies found evidence that linked cellular phone use to increased tumor risk ([Choi et al., 2020](#)).
- **February 2021-** A 4G study found kidney inflammation and damage to the testes in mice ([Hasan et al., 2021](#)).
- **March 2021-** The Switzerland Institute of the Environment expert published review found increased oxidative stress in the majority of animal studies and cell studies with exposures within regulatory limits ([Schuermann et al., 2021](#)).
- **July/August 2021-** Two systematic reviews find harm to sperm ([Sungjoon et al., 2021](#), [Yu et al., 2021](#)).
- **August 2021-** A review on impacts to the thyroid found RFR might be associated alterations in thyroid hormone levels, with a possible disruption in the hypothalamic-pituitary-thyroid axis ([Alkayyali et al., 2021](#)).
- **August 2021-** 2400 MHz effected the structural integrity of the hippocampus in mice ([Hasan et al., 2021](#)).
- **August 2021-** A review summarizes the effects of EMR on the neurotransmitters in the brain ([Hu et al., 2021](#)).
- **September 2021-** A systematic review on the effects of RFR to male reproductive hormones found that wireless can decrease testosterone reduction ([Maluin et al. 2021](#)).
- **September 2021-** A review on the genetic effects of non-ionizing electromagnetic fields found DNA strand breaks, micronucleus formation, and chromosomal structural changes ([Lai 2021](#)).
- **September 2021-** A systematic review published in the Annals of the New York Academy of Sciences found that neuronal ion channels are particularly affected ([Bertagna et al 2021](#)).
- **October 2021-** A review in the International Journal of Oncology describes how EMFs lead to dysfunction of ion channels which lead to reactive oxygen species/free radical overproduction providing " a complete picture" of how exposure may indeed lead to DNA damage and related pathologies, including cancer," ([Panagopoulos et al. 2021](#)).
- **October 2021-** [Scientific modeling study](#) finds RF absorption of a mosquito is 16x higher at 60 GHz than at 6 GHz indicating 5G future technologies "can cause dielectric heating and have an impact on behaviour, development and possibly spread of the insect" substantiating calls to ensure pollinators are protected before 5G deployment.

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