

To: Chair Middleton, Chair Davis, Chair Healey, Members of the Maryland Senate Finance Committee and the Rules and Executive Nominations Committee

From: Dr. Ronald N. Kostoff

Subj: Comments on Maryland Senate Bill 1188 and House Bill 1767

OVERVIEW

This letter describes potential adverse health effects that could result from passage of Maryland Senate Bill SB 1188 and House Bill 1767, and recommends defeat of these Bills.

SB 1188 and HB 1767 would significantly impair the ability of municipalities to regulate the siting of small cellular antennas and related infrastructure. They would preempt local authority regarding height of poles, size of equipment, amount of fees, and other critical factors that would affect quality of life issues in municipalities. These bills would convert an intrinsically local issue into a state issue. Most of all, **they would be a major contributing factor to the onset of myriad serious diseases, and would result in far more suffering and premature deaths than the mass shootings that capture our attention in the media.**

PERSONAL BACKGROUND

I received a Ph. D. in Aerospace and Mechanical Sciences from Princeton University in 1967, and subsequently worked for Bell Laboratories, Department of Energy, Office of Naval Research, and MITRE Corp. I have published over 200 peer-reviewed articles, served as Guest Editor of four journal Special Issues since 1994, obtained two text mining system patents, and presently am a Research Affiliate at Georgia Institute of Technology.

I have published on numerous medical topics in the peer-reviewed literature, including:

- potential treatments for Multiple Sclerosis, Alzheimer's Disease, Parkinson's Disease, Raynaud's Phenomenon, Cataracts, SARS, Vitreous Restoration, and Chronic Kidney Disease;
- potential causes of Chronic Kidney Disease and Alzheimer's Disease; and
- **potential impacts of Electromagnetic Fields on health.**

I am listed in:

- Who's Who in America, 60th Edition (2006);
- Who's Who in Science and Engineering, 9th Edition (2006), and
- 2000 Outstanding Intellectuals of the 21st Century, 4th Edition, (2006).

ADVERSE HEALTH EFFECTS FROM RADIOFREQUENCY RADIATION (RFR)

Health effects from non-ionizing radiation have been studied for decades. Much research effort has been focused on two parts of the frequency spectrum: power frequency (~60Hz) and RF (~1-2GHz). The former is used widely for powering equipment (light bulbs, motors, appliances, etc), and the latter is used for communications (cell phones, cell towers, Smart Meters, WiFi, etc).

The major sources of data on health effects (especially serious health effects) resulting from exposures to non-ionizing radiation have come from *animal experiments* and *human epidemiological studies*. These data reflect fundamentally different experimental conditions.

ANIMAL EXPERIMENTS

In our recent monograph on **Preventing and Reversing Alzheimer's disease** (<https://smartech.gatech.edu/handle/1853/59311>), we stated the following with regard to animal experiments:

"Additionally, results from animal testing (which could be long-term from the perspective of many short-lived animals used in testing) do not necessarily translate to human outcomes. First, there is a species difference, and impacts on one species do not necessarily carry over to the same types of impacts on another species. Second, laboratory animals are raised in relatively pristine environments, and subjected to a very few toxic substances during studies on disease contributing factors. Conversely, humans experience many of the contributing factors identified in reference [6], and the synergy from these combinations would not have been replicated in the laboratory animal testing."

In short, the animal experiments do not reflect the real world of simultaneous exposure to myriad toxic stimuli including RFR. What evidence do we have that these multiple toxic exposures are more harmful than individual exposures in isolation?

SYNERGETIC EFFECTS

Our recent invited book chapter on **Health Effects from Non-Ionizing Radiation Combined with other Stimuli**

(http://stip.gatech.edu/wp-content/uploads/2017/03/371048_1_En_4_Chapter_OnlinePDF.pdf) contains many examples where, for the non-ionizing parameters selected (radiation frequency, duration, intensity, etc),

- the radiation delivered in isolation may have had little or no effect,
- the other stimuli delivered in isolation may have had little or no effect, but
- the combination of the radiation and the other stimuli had a major effect.

Combination of toxic stimuli is the real-world of human exposure, not years in a pristine experimental apparatus exposed to RFR alone! In fact, if one of the main functions of RFR exposure is that of promoter, or enabler, or accelerator of adverse health effects, then concurrent exposures to other toxic stimuli are **required** to show the full extent of damage possible from RFR. Additionally, because of the latency period between the harmful exposure and the appearance of serious disease symptoms (latency can be up to five decades or more for some cancers or neurodegenerative diseases) , **long-term testing of combinations of toxic stimuli (including RFR) are required on human beings** to ensure the technologies are safe for human use. We do not have these long-term tests of combinations on human beings for 1-2GHz RFR. We don't have even short-term tests of these combinations on human beings for the millimeter-wave frequencies characteristic of 5G (~3-100GHz, or more), or long-term tests of millimeter-wave RFR in isolation on human beings.

In short, **implementing 5G in the near future without this level of health testing would be analogous to an inaugural commercial flight of an advanced passenger aircraft that had never been flight-tested.** Would any of the members of the Maryland State Senate or House agree to participate in this flight, or mandate that their constituents participate in this flight? Why, then, would they be willing to mandate (to their constituents) the equivalent of participating in this flight through passage of SB 1188 and HB 1767?

I provide some specific examples of these synergetic adverse health effects from our book chapter in Appendix 1, both for RF and for power (~60Hz) frequencies. There were over a hundred such examples in our book chapter, hundreds more examples we retrieved from Medline but did not include in the book chapter for space considerations, and a few hundred additional examples that were either not retrieved with the query used or entered the biomedical literature since the closing date for the chapter.

HUMAN EPIDEMIOLOGICAL STUDIES

There have been numerous human epidemiological studies that included exposures to RF, as well as known and unknown exposures to other toxic stimuli in combination. The handful of cell tower exposures studies (at 3G and 4G frequencies - ~1-2GHz) reported in our book chapter show unmistakable increases in cancer (and other serious illnesses) for residences within 500 meters of the antenna, with cancer incidence increasing as one goes closer to the antenna. Case control studies by Hardell (perhaps the world's leading RF epidemiological oncologist) show a **doubling** of some types of brain cancer with 'heavy' cell phone use by adults over ten years, and a **quintupling** of brain cancers for those who start cell phone use as children. Many other studies confirm these results. If we add on the higher frequencies associated with 5G, along with higher power fluxes because of **required** closer proximity to the short cell towers, we can expect these harmful effects to increase dramatically.

CONFLICT OF INTEREST

One reason for potential support of SB 1188 and HB 1767 by some members of the Maryland Senate and House could be related to potential conflicts of interest. For the telecommunications implementation issue, have the Senate and House members been vetted for conflict of interest?

This would include vetting:

- any elements of their investment portfolio that would profit from operation and expansion of the mobile telecommunications network, including impacts on related industries;
- any elements of their present business endeavors that would profit from operation and expansion of this network, including impacts on related industries;
- any elements of pensions received that would profit from operation and expansion of this network, including impacts on related industries;
- any proposals or future employment offers in the pipeline or being considered that would profit from operation and expansion of this network, including impacts on related industries;
- any other existing or potential conflicts of interest by which they could profit from operation and expansion of the mobile telecommunications network, including impacts on related industries.

Anyone conflicted should be required to recuse themselves from decision-making on SB 1188 or HB 1767.

Dr. Ronald N. Kostoff

APPENDIX 1 - EXAMPLES OF COMBINED EFFECTS OF NON-IONIZING EMF AND OTHER TOXIC STIMULI

(numbered references are those in the book chapter)

- a). "adverse effects of gamma-rays on cellular functions are strengthened by EMF" [44]
- b). "synergistic effect from RF exposure preceding the mutagen mitomycin C in an investigation of 954-MHz waves emitted by the antenna of a GSM base station" [45]
- c). ""ELF MFs have been reported to enhance the effects of known carcinogenic or mutagenic agents in a few animal studies and in several in vitro studies [47]"

d). "When the two types of radiation were delivered in a combination the sequence of delivery was of a significant importance. Antagonism of the effects was noted when microwave radiation was delivered prior to gamma-radiation. The effect was synergistic when the exposure to microwaves followed gamma-irradiation." [49]

e). "MF exposure significantly increased mammary tumor development and growth in SD1 [one substrain of Sprague-Dawley DMBA-exposed rats] but not SD2 [another substrain of Sprague-Dawley DMBA-exposed rats obtained from the same breeder] rats. These data indicate that the genetic background plays a pivotal role in effects of MF exposure." [71]

This example also shows how results can change/be manipulated by choice of test species. In fact, there are many ways the outcome of such experiments could be pre-determined by the 'right' choice of experimental parameters, including the test animal species, the frequencies and signal patterns selected, and whether any potentially toxic stimuli are administered in parallel with the RF radiation.

f). "872 MHz CW RF radiation at 5 W/kg might enhance chemically induced ROS production and thus cause secondary DNA damage" [121];

g). "The effects were more pronounced after treatment with both Cd and EMF than at the treatment with each exposure alone..... This work concluded that combined exposure to Cd and EMFs might increase the risk of plasma damage via enhancing free radical generation and protein oxidation." [149]

h). "microwave radiation for a significant acceleration of the development of benzopyrene-induced skin cancer and in shortening of life span of the tumor-bearing hosts "[66]

i). "solvents, lead, and pesticides/herbicides were only associated with glioma in workers also exposed to moderate or high levels of ELFMF [68]"

j). "long-term exposure of DMBA-treated female Sprague-Dawley rats in an alternating MF of low flux density promotes the development and growth of mammary tumors, thus indicating that MF exposure exerts tumor-promoting and/or co-promoting effects" [70]

k). "Although no association was found for childhood leukemia in relation to measured ELF or static magnetic fields alone, an increasing trend of leukemia risk with measured ELF fields was found for subjects within these static field.....findings suggest that the risk of childhood leukemia may be related to the combined effects of the static and ELF magnetic fields." [76]