

Cell Phone Usage Not Yet Linked to Cancer

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INTRODUCTION

As of 2017, it has been gathered that there are more than 5 billion cell phone users globally, and this number is only expected to increase in the coming years. With advancements in cell phone technology, screen time and usage has exponentially increased. This results in increased emitted energy wave frequencies which can be absorbed by the body. With the increase in cell phone usage across the world, many have begun to wonder whether or not cell phones play a role in cancer development.

Objectives

- Summarize the findings of the most popular epidemiologic cancer studies to date. These studies include The Danish Study, The Million Women Study, and The Interphone Study
- Compare non-ionizing energy to ionizing energy
- Distinguish between 1G, 2G, 3G, 4G, and 5G networks
- Assess the possible risks of cell phone advancement

RESULTS

- The Danish Study (1982-1995): Cohort Study, linked the billing info of 358,000+ cell phone subscribers with brain tumor incidence data from the Danish Cancer Registry. No significant findings were collected (Frei).
- The Million Women Study (1996-2001): Prospective Cohort Study, 1.3 million middle-aged women given a questionnaire that asked about socioeconomic status, geographic location, family medical history, and mobile phone usage. Info was used as a baseline. They were given another questionnaire every 3-4 years ending in 2009. Study showed that duration of mobile phone usage does not suggest an increased risk for developing all invasive cancers.
- The Interphone Study (1998-1999): Case Control Study, designed to analyze the relationship between cell phone use and risk of head and neck tumors. Done using participants from 13 countries. Subjects asked about medical history, cell phone usage, and type of cell phone they have via a questionnaire and interview. Study showed no conclusion that stated a correlation between cell phone usage and cancer rates.

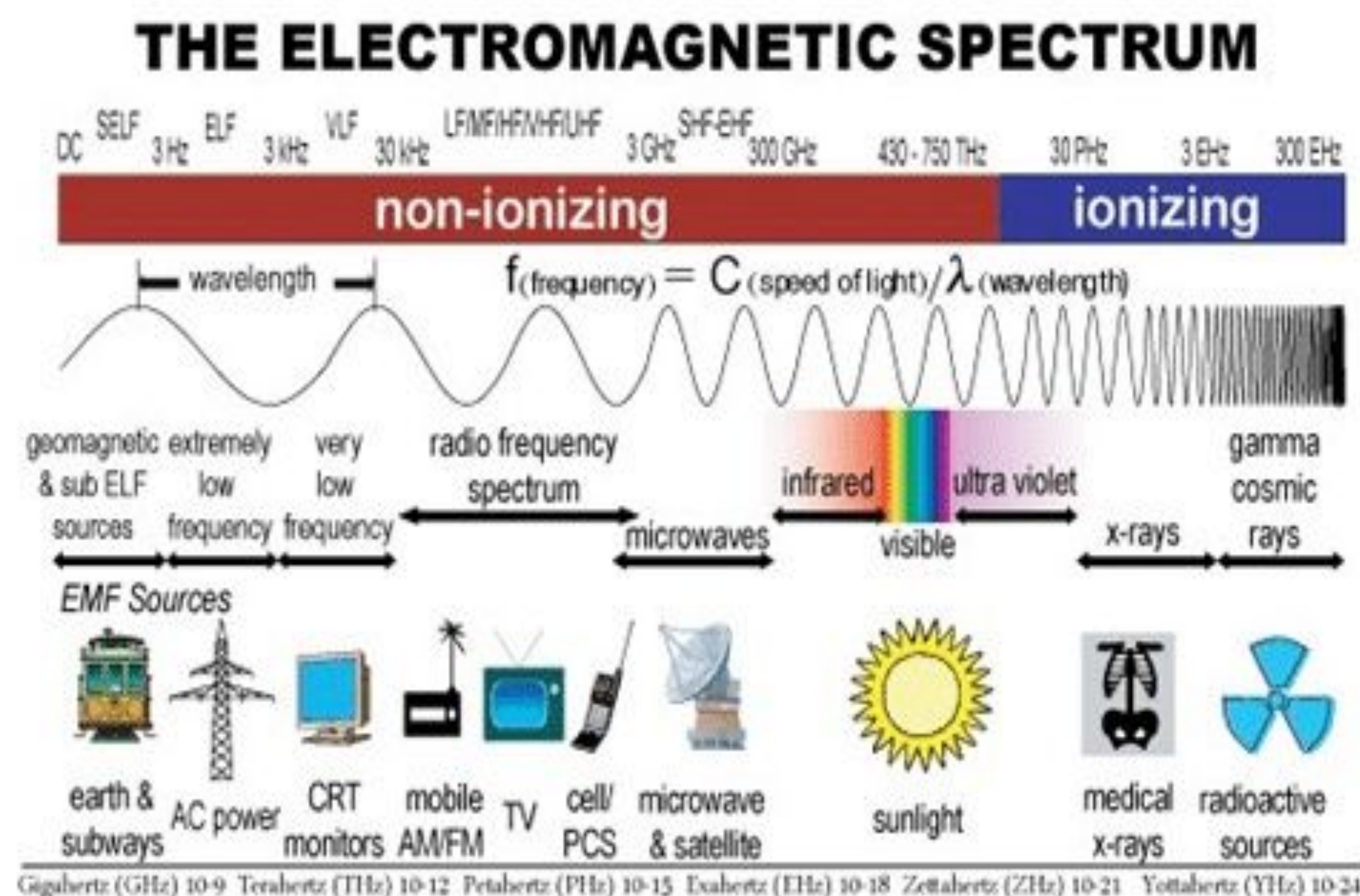


Figure 2. Electromagnetic Spectrum

- Ionizing radiation is high frequency energy that has the ability to excite large molecules in the body. Too much exposure to this can cause permanent damage to living tissues (Sienkiewicz). Non-ionizing radiation is energy in low frequency. Cell phones give off non-ionizing energy, which has the ability to heat the body. As cell phone companies increase the speed of their products, cells phones move closer to giving off ionizing energy. This has the potential to further damage cells of the body.

Technology	1G	2G	3G	4G	5G
Start/Deployment	1970-80	1990-2004	2004-10	Now	Coming Soon (estimated by 2020)
Frequency	0.15-0.9 GHz	1.8 GHz	2.0 GHz	2- 8 GHz	8-300 GHz
Data Bandwidth	2 Kbps	64 Kbps	2 Mbps	1 Gbps	Higher than 1 Gbps
Primary Service	Analog Phone Calls	Digital Phone Calls and Messaging	Phone Calls, Messaging, Data	All-IP Service (including Voice Messages)	High Speed, High Capacity and provide large Broadcasting of Data in Gbps
Key Differentiator	Mobility	Secure, Mass Adoption	Better Internet Experience	Faster Broadband Internet, Lower Latency	Better Coverage, no Dropped Calls, much lower Latency

Figure 1. Comparison of Generation Networks (Vora)

- 300 GHz= 0.3 THz. Range of infrared light is 1-430 THz. As frequencies of network generations increase to improve bandwidth, it poses the risk of increasing exposure to higher energy emittance which can be harmful the the body

CONCLUSIONS

The three epidemiologic studies performed to date show no significant relationship between cell phone use and cancer rates, but as frequencies of network generations increase to improve bandwidth, and screen time increases as cell phone technology advances, increased exposure to higher energy emittance may pose a threat to humans and increase cancer rates in the future. These assumptions cannot be supported, or refuted, until further studies are published that analyze modern cell phone technology and its effect on humans.

FUTURE WORK

- Assess the effect cell phones have on individuals that have been exposed all their life
- COSMOS: European Cohort study started March 2010

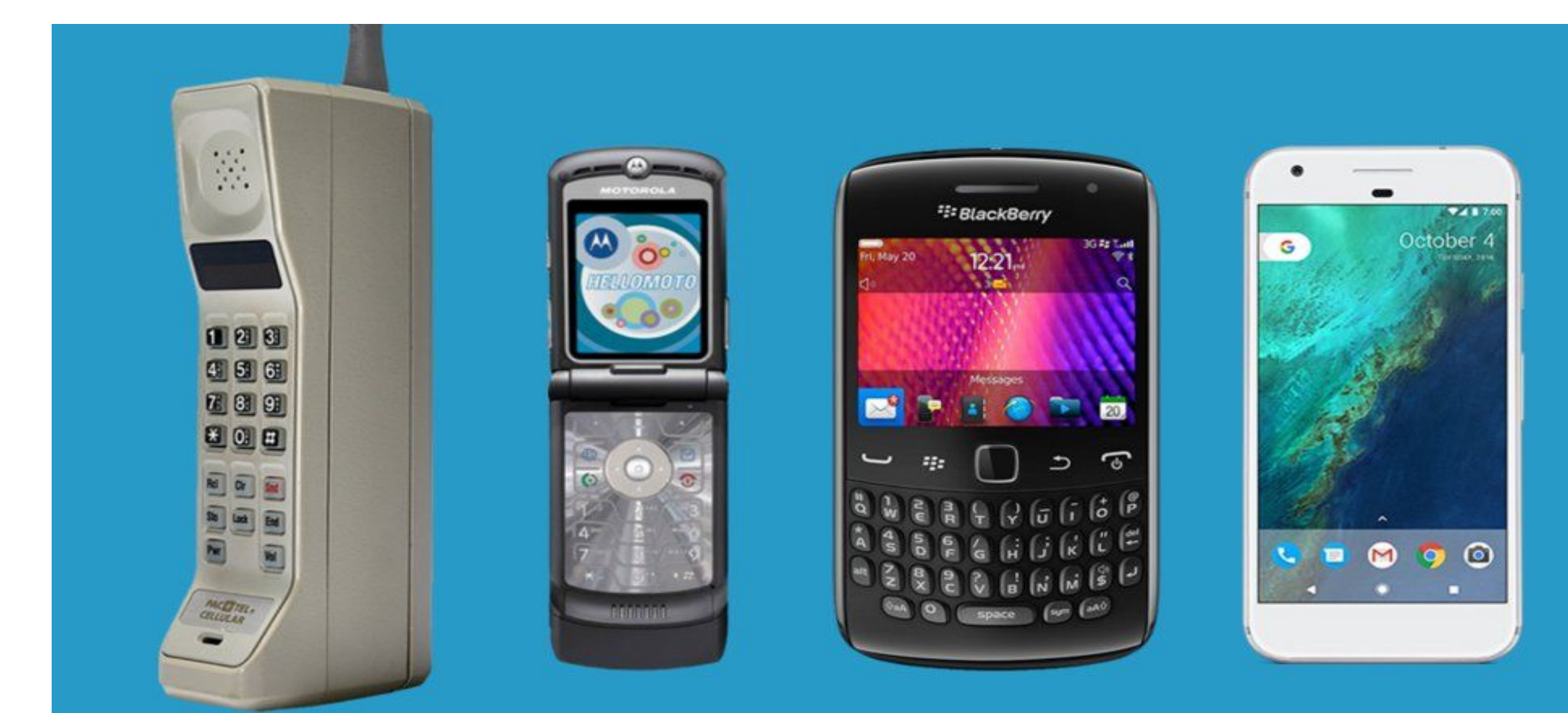


Figure 3. Evolution of Cell Phone Technology Over time

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