



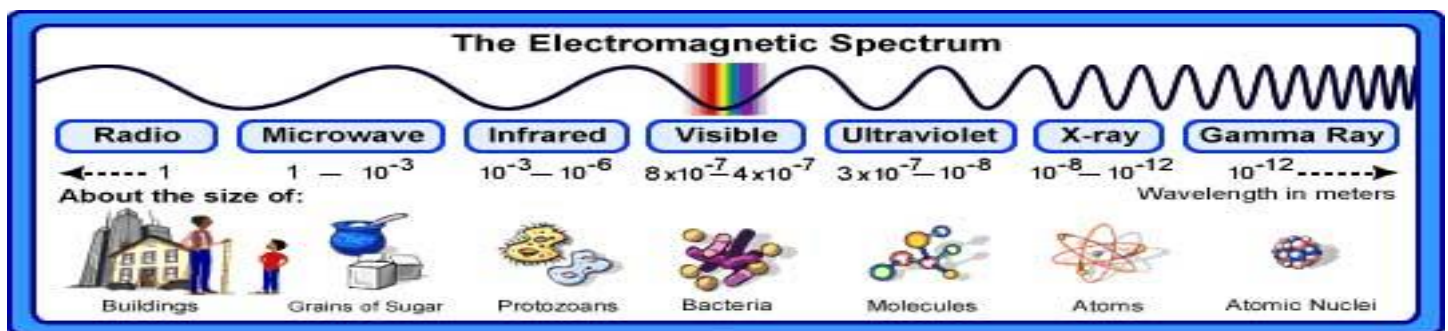
The **Hazard Evaluation and Emergency Response (HEER) Office** and the **Indoor and Radiological Health Branch (IRHB)** are part of the Hawai'i Department of Health's Environmental Health Administration whose mission is to protect human health and the environment.

What You Need to Know About Radiofrequency Energy and 5G cellular networks

This fact sheet provides an overview of radiofrequency (RF) energy and 5G cellular networks. Additionally, this fact sheet discusses issues surrounding exposure to radiofrequency energy, what's different about 5G cellular networks, potential human health concerns, and resources for further information.

What is Radiofrequency Energy?

RF energy is a form of non-ionizing electromagnetic radiation used in telecommunications such as radio, cell phones, television, satellite communications, microwaves, radar, and medical devices such as pacemakers. RF energy uses wavelengths that are lower than ionizing radiation such as x-rays and gamma rays. The longer wavelengths of RF energy lead to less impacts on the human body than the shorter wavelengths of ionizing radiation. RF energy decreases rapidly as you move away from the source. Because of the close proximity, the amount of RF energy people are exposed to from their cell phones is much higher than the exposure from living or working near a cell tower.



Is Radiofrequency Energy Dangerous to my Health?

For many years, there has been concern about health effects from RF energy related to cell phones, cell towers, and other environmental sources of RF energy. A large number of studies performed over the past two decades have not shown a direct health risk from short or long-term exposure to typical amounts of RF energy.

These studies looked at many types of health effects including cancer, cognitive function, memory, headaches, sleep, heart-rate, and other effects. While a few epidemiology studies did find a slight connection between



health effects and RF energy exposure, particularly cell phone usage, these studies were found to have flawed methods and the results were unable to be repeated.

Research to date has been done on 2G, 3G, and 4G cellular technologies, and while there is no evidence to suspect 5G networks will produce different health effects, more research is needed.

RF energy at very high levels can cause biological effects that result from heating of tissue (often referred to as “thermal” effects). In general, studies have shown that environmental levels of RF energy routinely encountered by the general public are typically far below levels necessary to produce significant heating and increased body temperature. However, there may be situations, particularly workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

Does Using Cell Phones or Living Near Cell Towers Cause Cancer?

The current body of scientific evidence does not show an association with cell phone use or living near cell towers and cancer. While studies specifically about living near towers are few, RF energy exposure from your personal cell phone is significantly higher than from living in close proximity to a cell tower and large studies do not show an association of heavy cell phone usage and cancer.

In 2011, the International Agency for Research on Cancer (IARC) designated RF energy as “2B-possibly cancer causing.” Other frequently used products in this same 2B category include coffee and talcum powder. More research is needed to further clarify this issue.

The strongest evidence that cell phone usage does not cause brain cancer is that cell phones have been very popular for two decades and there has not been an increase in the rates of brain cancer during that time.

How are 5G Networks Different from Current Cellular Networks?

5G networks use a higher frequency than 3G or 4G networks and are planned to be much faster and more reliable. The higher frequency uses shorter RF energy waves called millimeter waves. These millimeter waves are weaker than 3G or 4G at traveling long distances and cannot easily move through walls, buildings, and other physical obstacles. Because of this, to complete the 5G network and keep cell service strong and fast, many small antennae are required to provide adequate cellular coverage in an area. These antennae will likely be placed on homes, buildings, and other structures. It is expected that the addition of these 5G antennae will increase the environmental exposure to RF energy.

However, these increased exposures are likely to be less than from your personal cell phone and RF energy levels are projected to generally stay below limits set by the Federal Communications Commission (FCC). This increased exposure to RF energy from 5G networks is not expected to cause direct health effects. More research is needed to further our understanding of the effects of 5G networks.



3G cellular tower



How are Cellular Networks and Cell Phones Regulated?

5G cellular antenna
on a street light.

In the U.S., responsibility for regulating cellular networks and cell phones is shared by the Federal Communications Commission (FCC) and the U.S Food and Drug Administration (FDA). The FCC certifies wireless devices and sets limits on the amount of RF energy that a cell phone can emit. The FCC also regulates cell phone base stations (cell towers) and provides exposure guidelines that must be met. The FDA has the authority to take action if cell phones are shown to emit RF energy at levels considered hazardous to users.

What can I do if I remain worried about exposure to RF energy and 5G networks?

Stay informed by following updates and developments from trusted sources. Research into these issues is ongoing and more information will become available in the future. There are things you can do to reduce your exposure to RF energy including reducing the amount of time spent on your cell phone and using a hands-free device such as a headset or speaker-mode. Studies of specialized cell phone accessories claiming to shield the head from RF energy have not shown them to be any better at reducing RF energy exposure than hands-free devices.

Further Information

For questions related to radiofrequency radiation and 5G networks contact:

Hawai'i Department of Health
Indoor and Radiological Health Branch
99-945 Halawa Valley Street
Aiea, Hawai'i 96701

Telephone: (808) 586-4700
Website: <http://health.hawaii.gov/irhb/>

For questions related to environmental health:

Hawai'i Department of Health
Hazard Evaluation and Emergency Response Office
2385 Waimano Home Road
Pearl City, Hawai'i 96782

Telephone: (808) 586-4249
Website: <http://hawaii.gov/doh/heer>

Other resources for information about radiofrequency radiation and 5G networks:

Federal Communications Commission (FCC) RF Safety Program: email: rfsafety@fcc.gov phone: (888) 225-5322
www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety#Q5

World Health Organization (WHO): www.who.int/en/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones

National Institute of Environmental Health Sciences (NIEHS): www.niehs.nih.gov/health/topics/agents/cellphones/index.cfm

U.S. Food & Drug Administration (FDA): www.fda.gov/radiation-emitting-products/cell-phones/health-issues

National Cancer Institute (NCI): www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet?redirect=true

American Cancer Society (ACS): www.cancer.org/cancer/cancer-causes/radiation-exposure/cellular-phone-towers.html

International Agency for Research on Cancer (IARC): www.iarc.fr/wp-content/uploads/2018/07/pr208_E.pdf



International Commission on Non-ionizing Radiation Protection (ICNIRP): www.icnirp.org/en/frequencies/high-frequency/index.html

Health Canada: www.canada.ca/en/health-canada/services/environmental-workplace-health/radiation/consumer-radiation/radiofrequency-fields.html

