

**R**adiofrequency (RF) electromagnetic radiation is the transfer of energy by radio waves that lie in the frequency range three (3) kilohertz (kHz) to 300 gigahertz (GHz). This type of radiation is non-ionizing; it cannot break chemical bonds or remove electrons from an atom by ionization.

RF radiation occurs from natural sources (e.g., sun, earth, and earth's ionosphere) as well as generated by artificial sources (e.g., RF generators, radar).

Artificial RF sources are used at USC in the form of telecommunications, such as university radio and TV broadcasts from antennas, faculty/staff mobile phones, wireless networks, and local communication by radios (DPS walkie-talkies). Additionally, USC conducts research in microwave systems, radar processing, and medical applications using RF fields.

Microwave ovens, a common source of RF radiation, are used throughout USC. Generated microwaves (RF radiation) are absorbed by water molecules in food and vibrate energetically thus "cooking" the food. Exposure to microwaves is prevented by internal shielding and two independent safety interlock systems. Injuries typically occur from handling very hot food or superheated water that suddenly erupts.

## BIOLOGICAL EFFECT

The harmful biological effect from RF radiation exposure at high power densities is the rapid heating of organs and tissues. Eyes and testes are the most vulnerable because there are no major blood vessels in these areas to dissipate the heat.

However, RF power densities that the USC community and general public are routinely exposed to are far below the levels that cause harmful tissue heating and elevated body temperature. Though concerns about RF radiation exposure and cancer abound, studies are inconclusive whether a link exists.

For mobile phone usage specifically, the FDA states that, "To date, there is no consistent or credible scientific evidence of health problems caused by the exposure to radio frequency energy emitted by cell phones."

RF RADIATION - BIOLOGICAL EFFECTS  
SPECIFIC ABSORPTION RATE (SAR)



## What I need to know

- RF radiation is emitted from many everyday appliances and electronics e.g., microwaves, mobile phones, radios, and Wi-Fi networks.
- The low levels of RF radiation encountered by the public daily have power densities well below the levels that cause biological effects.
- Microwave ovens are safe to operate as they are designed to meet stringent FDA requirements.
- The main source of injuries from microwaves is due to overheated containers and food and not the RF radiation itself.

## SPECIFIC ABSORPTION RATE (SAR)

The U.S. Federal Communications Commission (FCC) has set standards for permissible exposure limits while using electronic devices. The FCC set a partial body Specific Absorption Rate (SAR) limit for mobile phones at or below 1.6 W/kg. To obtain a SAR value for a particular mobile phone model (or other radiofrequency device), enter the FCC ID number (usually found on the device's case) at [FCC ID Search](#).

NOTE: Published SAR values above or below the 1.6 W/kg standard should not be interpreted as a user's risk level.



## REFERENCES

US FDA [Scientific Evidence for Cell Phone Safety](#)

Australian Radiation Protection and Nuclear Safety Agency (arpana):  
[Radiofrequency Radiation](#)

Federal Communications Commission - [RF Safety FAQ](#)

CCR Title 8 [§5085. Radiofrequency and Microwave Radiation](#)

OSHA Safety and Health Topic:  
[Radiofrequency and Microwave Radiation](#)

