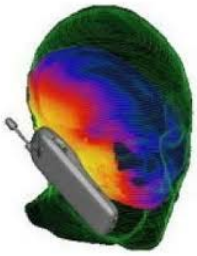
CELL PHONE SAFETY FACTSHEET

INTRODUCTION

There has been concern about the safety of cell phone use for as long as they have been available. The following information summarizes what is known at the present time concerning whether these phones can pose a significant health hazard, and what can be done to minimize any potential risks. There are also discussions concerning the various types of wireless/hands-free accessories available for cell phones, cell phone shields, physical hazards from cell phone use, and cell phone etiquette.

BACKGROUND



Cell phones, which are used by more than 250 million Americans, emit relatively low levels of radiofrequency (RF) radiation that is similar to the radiation generated inside microwave ovens and by radars, but at a *very much lower intensity*. A cell phone tends to emit considerably more RF radiation when its signal is weak and it is attempting to make contact with a distant cell phone tower, or when the phone is somewhat shielded from a cell phone tower such as when it is used inside of a building.

RF radiation is a form of ***non-ionizing radiation***, meaning that it does not have sufficient energy to knock electrons out of atoms and cause the types of health effects that the various forms of ionizing radiation such as x-rays and gamma rays can produce, such as damage to DNA.

HEALTH ISSUES

It is known that high levels of RF radiation can produce biological damage primarily due to tissue heating effects. But it is not known whether, to what extent, and through what mechanisms (if any), low levels of RF radiation might cause biological effects. Although research has been performed to answer these questions, no really clear picture of the biological effects of this type of radiation has emerged to date through peer-reviewed, reproducible, scientific studies. Therefore, our current knowledge does not permit us to state definitively that cell phones are safe, or that they are unsafe.

World Health Organization

Prior to May 2011, the best available scientific evidence did not demonstrate any significant adverse health effects (no increased risk of brain cancer, etc.) associated with the normal use of cell phones. ***However, in late May 2011, the World Health Organization (WHO) placed cell phones into the same "carcinogenic hazard" category as lead, engine exhaust, and chloroform.*** ["Carcinogenic" means cancer-causing.] A team of 31 scientists from 14 countries made this decision after performing a meta-analysis of many peer-reviewed studies (i.e., published in the scientific literature) on cell phone radiation effects. The team found that there was enough evidence to *suggest* that exposure to cell phone radiation is "possibly carcinogenic to humans". There was some evidence found that cell phone radiation can possibly increase the likelihood of 2 specific types of brain cancer (gliomas and acoustic neuromas).

The cell phone industry responded to the WHO announcement by stating that WHO did not conduct any new research, but simply reviewed the results of prior research, and that the WHO announcement "does not mean that cell phones cause cancer".

RF RADIATION EMISSION LEVELS

The parameter used to measure the radiation emitted by cell phones is the **specific absorption rate (SAR)** given in units of *Watts of power absorbed per kilogram of body tissue (W/kg).* The permissible upper limit for cell phones set by the U.S. Federal Communications Commission (FCC) is 1.6 W/kg of RF radiation.

The SAR value for your phone or for phones that you are thinking of purchasing can be found at these websites:

http://reviews.cnet.com/4520-6602_7-5020355-1.html

http://www.ewg.org/cellphoneradiation/Get-a-Safer-Phone

The SAR determined by testing your phone will be a number between 0 and 1.6 W/kg. As mentioned above, the SAR is a measure of the RF radiation that your brain absorbs. Knowing that the FCC limit is 1.6 W/kg and that some low-radiation phones have SARs lower that 0.2 W/kg, you will be able to tell where your phone stands regarding RF radiation emission.

http://en.wikipedia.org/wiki/Specific_absorption_rate

REDUCING RF RADIATION EXPOSURE

If there is an increased risk of certain types of brain cancer caused by cell phone radiation, it likely very small. But in order to minimize your potential risk, here are some simple steps that you can take:

- **Purchase a cell phone with a low SAR rating.** The difference in SAR between the highest-emitting phones and lowest-emitting phones is about a factor of about 8 times!

- **Reduce the amount of time that you spend on the cell phone by using a conventional corded phone whenever possible.** Use of a corded phone (also called a "land line") does not involve RF radiation exposure at all and it is the preferred option if you need to be on the phone ***a lot***. Corded phones should be used for normal day-to-day communication needs in homes and offices, especially for very lengthy calls and very frequent calls, just as a precaution. *Note: Cordless home/office phones (e.g., 1.9 GHz phones) also emit RF radiation, so precautions are needed when using those as well.*

- **Turn off your cell phone when it is not needed.** If you must keep your cell phone on near your body, keep the key pad towards your body, so the back end - with the antenna - faces out.

- **You can use the *speaker phone* setting on a cell phone to greatly reduce your RF radiation exposure because the phone's antenna will not be directly next to your head (and brain).** Be polite and avoid using the speaker phone when it will disturb others and disrupt their activities *(see cell phone etiquette section below).*

- **Use text or email messaging to reduce RF exposure to your head.** Phones emit less RF radiation when texting/emailing than they do for voice communications.

- The farther the phone is away from your head, the lower will be your RF radiation exposure. **Thus, holding the phone half an inch to an inch from your ear will greatly reduce your exposure.** Cell phone radiation drops off very quickly as you move away from the phone's antenna. As an approximation, if you double the distance between your head and the cell phone antenna, the radiation exposure is reduced to 1/4 of what it was initially. Hands, by the way, are very insensitive to cell phone radiation. Only brain cancers were implicated in the WHO study released in May 2011.

- Be aware that cell phones emit RF radiation to some degree even when in the "standby" mode - when they are on but not in use. However, the radiation emitted in the "standby" mode is much lower than that emitted when the phone is in use. The phone is always in contact with a nearby cell phone tower when it is on, thus some radiation is always emitted. **You can avoid this radiation by either keeping the phone off and letting calls go to voicemail, or keeping it away from your body like in a purse, backpack, briefcase, or laptop case.** *Keeping a cell phone in your pants pocket all day is not recommended.*

- **Use a wired earpiece.** This will greatly decrease the RF radiation exposure of your head. A small amount of radiation might be transmitted through the wire into your head, but that can be avoided by using a ferrite bead which attaches to the wire and absorbs any radiation travelling through the wire. They are sold at most electronics stores. http://en.wikipedia.org/wiki/Ferrite_bead


- **Exercising an abundance of caution, children should use cell phones for *emergency calls only*.** Children have thinner skulls and scalps such that cell phone radiation will penetrate deeper into their brains. The cells in children's brains are also dividing at a faster rate than those in adult brains, so the impact of RF radiation can possibly be greater with children than with adults.

- **Reduce the use of your cell phone when the signal is weak (fewer antenna signal bars on the phone).** Phones used in partially shielded locations such as in buildings, elevators, and in rural areas with no cell phone towers nearby need to work harder (i.e., emit more RF radiation) in an attempt to establish a connection. In addition, when using a cell phone in a moving vehicle the phone needs to emit more radiation as it establishes connections to successive cell phone towers coming into and out of range. Also, if using the phone without a headset, wait for the call to connect before placing the phone next to your ear. The emitted radiation is greatest when connecting.

- Although there is presently no suggestion of negative health effects to other parts of the human body except for the brain, **it is advisable to keep a cell phone well away from your body (don't place it between your legs when driving, for example).** Every increased distance that the phone is moved away from your body makes a sizable difference in your RF radiation exposure. Even a non-metallic belt clip will move the phone a little farther from your body and reduce your RF radiation exposure. ***Carrying a cell phone that is turned on in the pocket of your pants is not advisable.***

- **Do not use a "radiation shield" such as an antenna cap or keyboard cover.** They can create interference, reduce the connection quality, and force the phone to transmit at a higher power with even higher RF radiation emitted (*see below).*

- **Read your cell phone manual.** They often provide useful tips regarding safety.

WIRELESS/HANDS-FREE DEVICES

Hands-free kits can be used with cell phones for convenience, comfort, and improved safety. These systems reduce the absorption of RF radiation in your head because the phone's antenna, which is the source of the radiation, is not near your head. Some types of hands-free devices are described below.

Bluetooth Headsets

Bluetooth is the name of a wireless technology standard for connecting data or voice devices, thus replacing cords, wires, and cables. It uses RF radiation to transmit information over short distances of generally 10 meters or less. By embedding a Bluetooth chip and receiver into products, wires that would normally carry the data or voice signal can be eliminated. In the case of cell phone headsets, the voice signal is transmitted by RF radiation from the Bluetooth device in the cell phone to a receiver/headset.

Bluetooth headset antennas emit at much lower power levels than the cell phones themselves so the RF radiation exposure from a Bluetooth headset is insignificant by comparison. For example, a typical Ericsson Bluetooth headset generates an SAR of just 0.001 W/kg, far below that emitted by the cell phone antenna (as mentioned previously, that can be as high as 1.6 W/kg).

Thus, if you are concerned about the health effects of RF radiation, keep in mind that the cell phone is a much greater source of radiation than a Bluetooth headset.

If you use a Bluetooth headset, make sure that you switch it from ear to ear so that one side of your brain is not getting all of the RF exposure. Remove the headset when you are not going to be making a phone call to further reduce your RF exposure. Some wireless headsets emit a continuous low level of RF radiation when they are worn.

More information on Bluetooth headsets can be found at these websites:

http://telecom.hellodirect.com/docs/Tutorials/HeadsetBenefits.1.110200.asp
http://www.businessweek.com/technology/content/apr2005/tc20050427_5651.htm

Corded Earbuds

Corded earbud devices also reduce the RF radiation exposure to the head since the cell phone is not adjacent to the head during use. The voice signal is sent electronically to the earbud directly from the phone in a similar manner to when an earbud device is plugged into a radio. Of course, it is not advisable to place the cell phone on your lap when earbuds are used – the farther away from you the cell phone itself is, the lower will be your radiation exposure.

Air Tube Systems

The air tube hands-free headset keeps RF radiation away from the head by using a hollow "air tube" to transmit sound from the cell phone speaker through a tube containing air to an earpiece. The tube and earpiece contain no metal conductors, hence virtually eliminating any RF radiation otherwise present in conventional hands-free devices. The voice information is transmitted by sound waves in a plastic tube, not via RF radiation. The sound quality might not be as clear as with other hands-free options, so it would be best to test one before purchasing it or get a recommendation from an acquaintance who has one.

Information on air tube systems can be found at the following link: http://www.headsetairtube.com/

CELL PHONE SHIELDS

Since cell phones are so prevalent, it is not surprising that promoters have marketed RF "shields" as protection against the RF radiation the phones emit. But the U.S. Federal Trade Commission (FTC), the nation's consumer protection agency, says that manufacturer claims regarding these "shields" are mostly baseless.

According to the FTC, there is no scientific proof that the so-called "shields" significantly reduce RF radiation exposure from cell phones. In fact, says the agency, products which block only the earpiece or another small portion of the cell phone are totally ineffective because much of the phone emits some radiation. What's more, these shields can interfere with the phone's voice signal, causing it to draw even more power to communicate effectively with the base station, and possibly emitting even more radiation.

The FTC works for the consumer to prevent fraudulent and deceptive business practices in the marketplace and to provide information to help consumers spot, stop, and avoid scams. If you believe that you have been cheated by purchasing a cell phone "shield", you can file a complaint or obtain free information on consumer issues by visiting www.ftc.gov or calling toll-free 1-877-FTC-HELP (1-877-382-4357).

More information concerning cell phone shields can be found at this website below:

http://www.cbsnews.com/stories/2002/02/20/tech/main330039.shtml

http://www.chicagotribune.com/health/chi-tc-health-skeptic-cell-donejun26,0,1956147.story

PHYSICAL HAZARDS FROM CELL PHONE USE

Although the radiation risk from the use of cell phones is considered to be relatively small, there are other substantially more serious hazards related to use of these phones. Many people use them while they are performing tasks that demand the user's complete attention. Following some general rules will help in reducing these hazards:

- Avoid using a cell phone while driving or while operating potentially dangerous equipment (power tools, lawn mowers, etc.).

- If you need to use a cell phone while driving, make sure that it is a hands-free system, especially in states and municipalities in which the use of a hand-held cell phone while driving is prohibited by law (this includes **California**).

- **Keep in mind that the danger related to cell phone conversations while driving is not solely due to only having one hand on the steering wheel. *Rather, conducting a phone conversation causes driver inattention/distraction which in turn can lead to accidents.*** Drivers appear to be particularly prone to distraction during lengthy or emotionally-charged phone conversations.

- **Never read or write text messages in a moving vehicle** (this is also illegal in many states and municipalities, including in California)! Also, do not write information on paper that is conveyed to you over your hands-free phone (phone numbers, addresses, etc.) while driving. Don't take notes or look up phone numbers in phone books.

☞ *If it is <u>absolutely necessary</u> to use a cell phone while driving a vehicle, adhering to some simple rules will greatly reduce the likelihood of accidents. Make sure that you:*

- Are prepared for possible calls by having your hands-free device in a readily available location (on the adjacent car seat). It can be dangerous to have to search through a purse or bag for a phone while in a moving vehicle.

- Don't try to figure out how to use special features of a phone until it is safe (do that ahead of time).

- Don't use the phone at all while driving in bad weather conditions (rain, fog, snow, etc.).

- Dial phone numbers only while at stop lights or stop signs, or pull over to the side of the road to talk.

- Keep phone calls as brief as possible.

- Practice using the phone prior to using it while driving.

- Your cell phone screen might be too small for you to quickly see who is calling, so don't check for caller ID info while driving; it's just too distracting. Let incoming calls go to voice mail and retrieve the messages later when it is safe.

- Be careful when pulling over to the side of the road to place phone calls. To avoid being a crime victim, do not stop in dangerous areas and keep your car doors locked and windows closed. Make sure 911 is programmed into your phone.

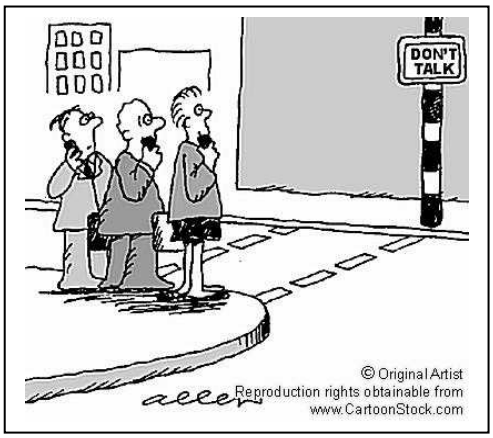
- Don't stop on the highway to make or answer a cell phone call. It can be dangerous to pull over onto a highway shoulder and then merge back into fast-moving traffic. If you need to make a call while you're on the highway, get off at the nearest exit to make the call.

- Print driving directions in large lettering before you leave. If you get lost driving to an appointment, it's tempting to simply call the person you'll be meeting and ask for assistance. Printing out directions to refer to only when you're parked helps you avoid that temptation.

- Concentrate on the road! Don't get carried away talking on the phone. Keep both hands on the wheel and both eyes on the road.

The U. S. Federal Communications Commission (FCC) has published information regarding cell phone safety. It can be accessed at the website below:

http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/CellPhones/default.htm



Note: It is not only during driving that people can experience safety problems when distracted by a cell phone conversation. People have been reported to have walked into traffic, fallen into ditches, and walked against red lights while on the phone. ***Try to limit conversations to times when you can devote your full concentration to the call.***

CELL PHONE ETIQUETTE

Always be respectful of others when you use a cell phone. Sharing space with someone talking loudly on a cell phone can be a real nuisance. Be sure to turn your phone off or put it on vibrate-only mode when in libraries, churches, movie theaters, restaurants, etc. Be cognizant of signs indicating that cell phone use is prohibited, like in many hospitals and medical buildings. Remember that politeness can be contagious!

CONCLUSION

Cell phones are very convenient, useful devices and they are still considered to be relatively safe for normal use. The WHO study just suggests that the occurrence of certain brain cancers might increase with cell phone use, but more studies are currently underway concerning possible long-term health effects due to repeated exposures to RF radiation over decades of cell phone use. Nobody should fear using their cell phone as a result of the WHO study, but exercising some caution and following the advice above to limit your exposure to RF cell phone radiation is advisable in light of the WHO study.

If you have additional questions or concerns regarding cell phone safety, contact Rick Mannix of EH&S at 949-824-6098 or by email at ***rcmannix@uci.edu***