Wearable Computers and Wearable Technology

What are wearable computers and wearable technology?

Wearable computers and wearable technology are small devices using computers and other advanced technology that are designed to be worn in clothing or directly against the body. These devices are usually used for entertainment and performing other tasks like monitoring physical activity.

Wearable technology typically uses low-powered radiofrequency (RF) transmitters to transmit and receive data from smartphones or the Internet. RF transmitters emit radio waves, a type of non-ionizing radiation.

Most devices that are currently available use low-powered Bluetooth technology similar to that used in "hands free" headsets for cellular telephones and many other wireless consumer devices. Some devices may use Wi-Fi or other communication technologies as well.

What are some examples of wearable computers and wearable technology?

Familiar examples of wearable computers or wearable technology include "smartwatches" and fitness trackers. Future devices could include head-mounted displays and a wide variety of personal health monitors.

Wearable Technology and Safety

RF transmitters in wearable technology expose the user to some level of RF energy (a form of non-ionizing radiation). Some citizens have expressed concerns about the possible health effects of such exposures.

For more information on wireless networks and radiation, click here
For more information on non-ionizing radiation, click here

RF transmitters in wearable devices operate at extremely low power levels. Moreover, wearable devices normally transmit signals for small fractions of the time. As a result, the RF exposure to the user of such devices over time will be very small.

What are the government requirements in limiting RF energy exposure?

To be sold in the U.S., all devices that transmit RF signals must meet limits for human exposure to RF energy set by the Federal Communications Commission (FCC).

While the guidelines were adopted in 1996, they are similar to major international guidelines that are presently in effect in many other countries. Wearable devices expose the user to small amounts of RF energy compared to major international exposure limits.

Of much greater concern, wearable devices can potentially raise a number of safety and other issues unrelated to RF energy exposure. Some wearable devices, such as smartwatches that alert the user to incoming emails or text messages, are significant sources of distraction to the user. This is a major concern if you are driving a car or participating in other activities that require close attention.

What you need to know:

Comment [DJ(]: Are RF transmitters in the same range as radio waves?

?? RF transmitters emit radiowaves

Comment [ilj1]: Not sure if all devices under the moniker of fitness trackers release RF radiation. For example, stopwatches.

Comment [DJ(]: Link to Wireless networks and exposure to RF energy content

Comment [ilj1]: Link to non-ionizing content; include RF in non-ionizing?

- Most wearable devices include low-powered RF transmitters to enable them to communicate with other devices.
- To be sold in the U.S., all such devices must meet FCC limits for human exposure to RF energy.
- Wearable devices produce negligible levels of RF exposure to the user compared to major international exposure limits.
- Wearable electronics may distract the user and increase the chances of injury while driving or using dangerous equipment.
- CDC will continue to monitor this topic.

For More Information:

The Federal Communications Commission (FCC)
CDC- Frequently Asked Questions about Cell Phones and Your Health
CDC – Wireless Networks and Exposure to RF Energy
NIH – Cell Phones
National Cancer Institute – Cell Phones and Cancer Risk
WHO – Electromagnetic Fields (EMF)
HPS – Micro/Radio Waves, Radar and Powerlines
NIH – Electric and Magnetic Fields
NIEHS - EMF: Electric and Magnetic Fields Associated with the Use of Electric Power. June 2002.

References

Comment [DJ(]: Link for Wireless Networks content not yet completed/live

Comment [ilj1]: Removed – doesn't appear to have a lot of updated content

This content is part of a larger effort to revise and update the Radiation and Your Health website (http://www.cdc.gov/nceh/radiation) to make it more engaging and easily understood. Radiation is a very hard topic to understand and has many nuances that are hard to explain, requiring additional emphasis on the use of effective communication practices and innovative strategies. A primary effort of the Radiation Studies Branch is getting the most up-to-date, accurate, readable information to the public and professional audiences. Updating this content is paramount to that effort.

Several pieces will be entered into eClearance over the next several months that are parts of this redesigned website. The attached content outline describes how this webpage content connects to the overall picture of updating, revising, and reorganizing content on the Radiation and Your Health website.

This content has been reviewed and approved by SMEs in the Radiation Studies Branch.

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Wearable Technology and Safety

RF transmitters in wearable technology expose the user to some level of RF radiation. RF radiation is a form of non-ionizing radiation made up of radiowaves. ~~(a form of non-ionizing radiation). Some citizens have expressed concerns about the possible health effects of such exposures.~~

For more information on RF radiation, click here.
For more information on non-ionizing radiation, click here.

RF transmitters in wearable devices operate at extremely low power levels. ~~Moreover, wearable devices~~ and normally transmit signals ~~for small fractions of the time~~over a short period of time. As a result, wearable devices expose the user to very small levels of RF radiation over time~~the RF exposure to the user of such devices over time will be very small~~.

How much RF radiation am I exposed to?

To be sold in the U.S., equipment that transmits RF radiation must meet exposure limits set by the Federal Communications Commission (FCC). These limits are designed to protect against all known hazards of RF radiation.

While the guidelines were adopted in 1996, they are similar to major international guidelines that are presently in effect in many other countries. Wearable devices expose the user to small amounts of RF ~~energy~~ radiation compared to major international exposure limits.

Wearable technology can distract you

~~Of much greater concern, w~~If you use wearable devices, it could be a source of distraction and ~~can potentially~~ raise a number of safety and other issues unrelated to RF ~~energy~~ radiation exposure. ~~Some wearable devices, such as smartwatches that alert the user to incoming emails or text messages, are significant sources of distraction to the user.~~ This is a major concern if you are driving a car or participating in other activities that require close attention.

What you need to know:

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- To be sold in the U.S., all such devices must meet FCC limits for human exposure to RF ~~energy~~radiation.

Comment [DJ(]: Link to CDC RF radiation content

Comment [DJ(]: Link to CDC non-ionizing content

Comment [DJ(]: Do people need to know this?

- Wearable devices ~~produce~~ expose the user to low amounts of ~~negligible levels of RF~~ RF radiation ~~exposure to the user~~ compared to major international exposure limits.
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NIH – Electric and Magnetic Fields
NIEHS - EMF: Electric and Magnetic Fields Associated with the Use of Electric Power. June 2002.

~~References~~

Comment [DJ(]: Currently being put together, not yet online...

Comment [DJ(]: Link for Wireless Networks content not yet completed/live