

# Cell phone use may have effect on brain activity, but health consequences unknown

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In a preliminary study, researchers found that 50-minute cell phone use was associated with increased brain glucose metabolism (a marker of brain activity) in the region closest to the phone antenna, but the finding is of unknown clinical significance, according to a study in the February 23 issue of *JAMA*.

"The dramatic worldwide increase in use of cellular telephones has prompted concerns regarding potential harmful effects of exposure to radiofrequency-modulated electromagnetic fields (RF-EMFs). Of particular concern has been the potential carcinogenic effects from the RF-EMF emissions of cell phones. However, epidemiologic studies of the association between cell phone use and prevalence of [brain tumors](#) have been inconsistent (some, but not all, studies showed increased risk), and the issue remains unresolved," according to background information in the article. The authors add that studies performed in humans to investigate the effects of RF-EMF exposures from cell phones have yielded variable results, highlighting the need for studies to document whether RF-EMFs from cell phone use affects brain function in humans.

Nora D. Volkow, M.D., of the National Institutes of Health, Bethesda, Md., and colleagues conducted a study to assess if cell phone exposure affected regional activity in the human brain. The randomized study, conducted between January 1 and December 31, 2009, included 47 participants. Cell phones were placed on the left and right ears and brain imaging was performed with positron [emission tomography](#) (PET) with (18F)fluorodeoxyglucose injection, used to measure brain [glucose](#)

[metabolism](#) twice, once with the right cell phone activated (sound muted) for 50 minutes ("on" condition) and once with both cell phones deactivated ("off" condition). Analysis was conducted to verify the association of metabolism and estimated amplitude of radiofrequency-modulated [electromagnetic waves](#) emitted by the cell phone. The PET scans were compared to assess the effect of cell phone use on brain glucose metabolism.

The researchers found that whole-brain metabolism did not differ between the on and off conditions. However, there were significant regional effects. Metabolism in the brain region closest to the antenna (orbitofrontal cortex and temporal pole) was significantly higher (approximately 7 percent) for cell phone on than for cell phone off conditions. "The increases were significantly correlated with the estimated electromagnetic field amplitudes both for absolute metabolism and normalized metabolism," the authors write. "This indicates that the regions expected to have the greater absorption of RF-EMFs from the cell phone exposure were the ones that showed the larger increases in glucose metabolism."

"These results provide evidence that the human brain is sensitive to the effects of RF-EMFs from acute cell phone exposures," the researchers write. They add that the mechanisms by which RF-EMFs could affect brain glucose metabolism are unclear.

"Concern has been raised by the possibility that RF-EMFs emitted by cell phones may induce brain cancer. ... Results of this study provide evidence that acute cell phone exposure affects brain metabolic activity. However, these results provide no information as to their relevance regarding potential [carcinogenic effects](#) (or lack of such effects) from chronic cell phone use."

"Further studies are needed to assess if these effects could have potential

long-term harmful consequences," the authors conclude.

The results of this study add information about the possible effects of radiofrequency emissions from wireless phones on [brain activity](#), write Henry Lai, Ph.D., of the University of Washington, Seattle, and Lennart Hardell, M.D., Ph.D., of University Hospital, Orebro, Sweden, in an accompanying editorial.

"Although the biological significance, if any, of increased glucose metabolism from acute cell phone exposure is unknown, the results warrant further investigation. An important question is whether glucose metabolism in the brain would be chronically increased from regular use of a wireless phone with higher radiofrequency energy than those used in the current study. Potential acute and chronic health effects need to be clarified. Much has to be done to further investigate and understand these effects."

The editorial authors also question whether the findings of Volkow et al may be a marker of other alterations in [brain function](#) from radiofrequency emissions, such as neurotransmitter and neurochemical activities? "If so, this might have effects on other organs, leading to unwanted physiological responses. Further studies on biomarkers of functional [brain](#) changes from exposure to radiofrequency radiation are definitely warranted."

**More information:** *JAMA*. 2011;305[8]808-814.

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