

# Cell phone radiation exposure on brain and associated biological systems.

[Kesari KK](#), [Siddiqui MH](#), [Meena R](#), [Verma HN](#), [Kumar S](#).

## Source

kavindra\_biotech@yahoo.co.in

## Abstract

Wireless technologies are ubiquitous today and the mobile phones are one of the prodigious output of this technology. Although the familiarization and dependency of mobile phones is growing at an alarming pace, the biological effects due to the exposure of radiations have become a subject of intense debate. The present evidence on mobile phone radiation exposure is based on scientific research and public policy initiative to give an overview of what is known of biological effects that occur at radiofrequency (RF)/ electromagnetic fields (EMFs) exposure. The conflict in conclusions is mainly because of difficulty in controlling the affecting parameters. Biological effects are dependent not only on the distance and size of the object (with respect to the object) but also on the environmental parameters. Health endpoints reported to be associated with RF include childhood leukemia, brain tumors, genotoxic effects, neurological effects and neurodegenerative diseases, immune system deregulation, allergic and inflammatory responses, infertility and some cardiovascular effects. Most of the reports conclude a reasonable suspicion of mobile phone risk that exists based on clear evidence of bio-effects which with prolonged exposures may reasonably be presumed to result in health impacts. The present study summarizes the public issue based on mobile phone radiation exposure and their biological effects. This review concludes that the regular and long term use of microwave devices (mobile phone, microwave oven) at domestic level can have negative impact upon biological system especially on brain. It also suggests that increased reactive oxygen species (ROS) play an important role by enhancing the effect of microwave radiations which may cause neurodegenerative diseases.

PMID:

23678539

[PubMed - indexed for MEDLINE]

## [Publication Types, MeSH Terms, Substances](#)

### Publication Types

- [Research Support, Non-U.S. Gov't](#)
- [Review](#)

### MeSH Terms

- [Animals](#)
- [Apoptosis](#)
- [Biophysics/methods](#)
- [Brain/radiation effects\\*](#)
- [Brain Neoplasms/etiology](#)
- [Cell Cycle](#)
- [Cell Line, Tumor](#)
- [Cellular Phone\\*](#)
- [Central Nervous System/radiation effects](#)

- [DNA Damage/radiation effects](#)
- [Electromagnetic Fields](#)
- [Environmental Exposure](#)
- [Free Radicals](#)
- [Humans](#)
- [Mice](#)
- [Models, Biological](#)
- [Mutagens](#)
- [Neoplasms, Radiation-Induced/diagnosis](#)
- [Radiometry](#)
- [Rats](#)
- [Reactive Oxygen Species](#)

#### **Substances**

- [Free Radicals](#)
- [Mutagens](#)
- [Reactive Oxygen Species](#)

#### **[LinkOut - more resources](#)**

#### **Display Settings:**

- [Abstract](#)

#### **Send to:**

[Biomed Pharmacother.](#) 2008 Feb;62(2):104-9. doi: 10.1016/j.biopha.2007.12.004. Epub 2007 Dec 31.

## **Biological effects from electromagnetic field exposure and public exposure standards.**

[Hardell L](#), [Sage C](#).

#### **Source**

Department of Oncology, University Hospital, SE-701 85 Orebro, Sweden. [lennart.hardell@orebroll.se](mailto:lennart.hardell@orebroll.se)

#### **Abstract**

During recent years there has been increasing public concern on potential health risks from power-frequency fields (extremely low frequency electromagnetic fields; ELF) and from radiofrequency/microwave radiation emissions (RF) from wireless communications. Non-thermal (low-intensity) biological effects have not been considered for regulation of microwave exposure, although numerous scientific reports indicate such effects. The BioInitiative Report is based on an international research and public policy initiative to give an overview of what is known of biological effects that occur at low-intensity electromagnetic fields (EMFs) exposure. Health endpoints reported to be associated with ELF and/or RF include childhood leukaemia, brain tumours, genotoxic effects, neurological effects and neurodegenerative diseases, immune system deregulation, allergic and inflammatory responses, breast

cancer, miscarriage and some cardiovascular effects. The BioInitiative Report concluded that a reasonable suspicion of risk exists based on clear evidence of bioeffects at environmentally relevant levels, which, with prolonged exposures may reasonably be presumed to result in health impacts. Regarding ELF a new lower public safety limit for habitable space adjacent to all new or upgraded power lines and for all other new constructions should be applied. A new lower limit should also be used for existing habitable space for children and/or women who are pregnant. A precautionary limit should be adopted for outdoor, cumulative RF exposure and for cumulative indoor RF fields with considerably lower limits than existing guidelines, see the BioInitiative Report. The current guidelines for the US and European microwave exposure from mobile phones, for the brain are 1.6 W/Kg and 2 W/Kg, respectively. Since use of mobile phones is associated with an increased risk for brain tumour after 10 years, a new biologically based guideline is warranted. Other health impacts associated with exposure to electromagnetic fields not summarized here may be found in the BioInitiative Report at [www.bioinitiative.org](http://www.bioinitiative.org).

PMID:

18242044

[PubMed - indexed for MEDLINE]

### **Publication Types, MeSH Terms**

#### **Publication Types**

- [Research Support, Non-U.S. Gov't](#)
- [Review](#)

#### **MeSH Terms**

- [Cellular Phone](#)
- [Child](#)
- [Electromagnetic Fields/adverse effects\\*](#)
- [Environmental Exposure/adverse effects\\*](#)
- [Environmental Exposure/legislation & jurisprudence](#)
- [Female](#)
- [Humans](#)
- [Maximum Allowable Concentration](#)
- [Neoplasms, Radiation-Induced/epidemiology](#)
- [Neoplasms, Radiation-Induced/etiology](#)
- [Pregnancy](#)
- [Radiation Monitoring/standards](#)
- [Radio Waves/adverse effects\\*](#)
- [Risk Assessment](#)

### **LinkOut - more resources**

#### **Full Text Sources**

- [Elsevier Science](#)
- [Clinical Key](#)
- [EBSCO](#)

#### **Other Literature Sources**

- [Labome Researcher Resource - ExactAntigen/Labome](#)

## Medical

- [Electromagnetic Fields - MedlinePlus Health Information](#)
- 

## supplemental Content



## Save items

[Add to Favorites](#)[View more options](#)

- [Create collection...](#)
- [Manage collections...](#)

loading

## Related citations in PubMed

- **Review** Low-level exposure to radiofrequency electromagnetic fields: health effects and research needs.[*Bioelectromagnetics*. 1998]
- **Review** Recent advances in research on radiofrequency fields and health: 2004-2007.[*J Toxicol Environ Health B Crit Rev*. 2009]
- Electromagnetic fields and health outcomes.[*Ann Acad Med Singapore*. 2001]
- COMAR technical information statement: expert reviews on potential health effects of radiofrequency electromagnetic fields and comments on the bioinitiative report.[*Health Phys*. 2009]
- **Review** [Radio and microwave frequency radiation and health--an analysis of the literature].[*Gesundheitswesen*. 2003]

[See reviews...](#)[See all...](#)

## Cited by 8 PubMed Central articles

- Reactive oxygen species formation and apoptosis in human peripheral blood mononuclear cell induced by 900 MHz mobile phone radiation.[*Oxid Med Cell Longev*. 2012]
- The anti-tumor effect of A3 adenosine receptors is potentiated by pulsed electromagnetic fields in cultured neural cancer cells.[*PLoS One*. 2012]
- The therapeutic effect of a pulsed electromagnetic field on the reproductive patterns of male Wistar rats exposed to a 2.45-GHz microwave field.[*Clinics (Sao Paulo)*. 2011]

[See all...](#)

## Related information

- [Related Citations](#)
  - [Cited in PMC](#)
- 

### Recent Activity

[Clear](#)

### Display Settings:

- [Abstract](#)

### Send to:

[Neuro Oncol.](#) 2010 Nov;12(11):1147-51. doi: 10.1093/neuonc/noq077. Epub 2010 Jul 16.

## **Brain cancer incidence trends in relation to cellular telephone use in the United States.**

[Inskip PD](#), [Hoover RN](#), [Devesa SS](#).

### Source

Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Executive Plaza South, Room 7052, Bethesda, MD 20892, USA. [inskippe@mail.nih.gov](mailto:inskippe@mail.nih.gov)

### Abstract

The use of cellular telephones has grown explosively during the past two decades, and there are now more than 279 million wireless subscribers in the United States. If cellular phone use causes brain cancer, as some suggest, the potential public health implications could be considerable. One might expect the effects of such a prevalent exposure to be reflected in general population incidence rates, unless the induction period is very long or confined to very long-term users. To address this issue, we examined temporal trends in brain cancer incidence rates in the United States, using data collected by the Surveillance, Epidemiology, and End Results (SEER) Program. Log-linear models were used to estimate the annual percent change in rates among whites. With the exception of the 20-29-year age group, the trends for 1992-2006 were downward or flat. Among those aged 20-29 years, there was a statistically significant increasing trend between 1992 and 2006 among females but not among males. The recent trend in 20-29-year-old women was driven by a rising incidence of frontal lobe cancers. No increases were apparent for temporal or parietal lobe cancers, or cancers of the cerebellum, which involve the parts of the brain that would be more highly exposed to radiofrequency radiation from cellular phones. Frontal lobe cancer rates also rose among 20-29-year-old males, but the increase began earlier than among females and before cell phone use was highly prevalent. Overall, these incidence data do not provide support to the view that cellular phone use causes brain cancer.

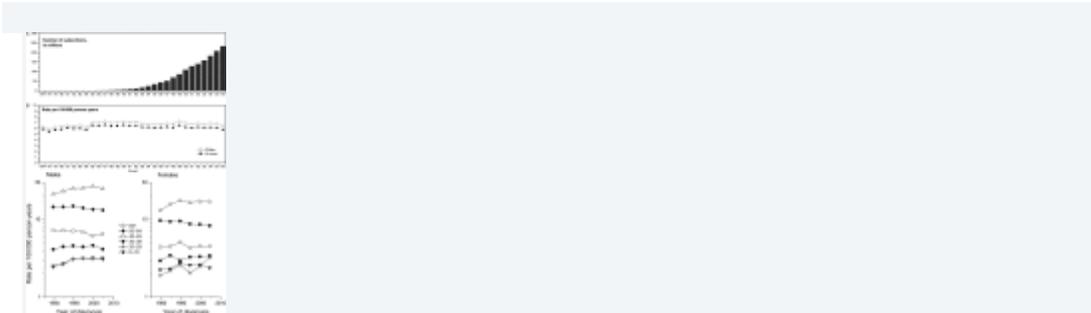
### Comment in

- [The problem with cell phones...or maybe not.](#) [Neuro Oncol. 2010]

PMID:

20639214  
[PubMed - indexed for MEDLINE]  
PMCID:  
PMC3098028  
[Free PMC Article](#)

Images from this publication. [See all images \(2\)](#) [Free text](#)



## **Publication Types, MeSH Terms**

### **Publication Types**

- [Research Support, Non-U.S. Gov't](#)

### **MeSH Terms**

- [Adult](#)
- [Age Distribution](#)
- [Brain Neoplasms/epidemiology\\*](#)
- [Brain Neoplasms/etiology\\*](#)
- [Cellular Phone\\*](#)
- [Female](#)
- [Humans](#)
- [Male](#)
- [Radio Waves/adverse effects\\*](#)
- [SEER Program](#)
- [United States/epidemiology](#)
- [Young Adult](#)

## **LinkOut - more resources**

### **Full Text Sources**

- [HighWire](#)
- [EBSCO](#)
- [Europe PubMed Central](#)
- [Ovid Technologies, Inc.](#)
- [PubMed Central](#)
- [PubMed Central Canada](#)

### **Other Literature Sources**

- [COS Scholar Universe](#)
- [Labome Researcher Resource - ExactAntigen/Labome](#)

## Medical

- [Brain Cancer - MedlinePlus Health Information](#)
- 

## supplemental Content

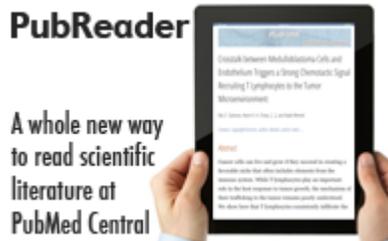


## Save items

[Add to FavoritesView more options](#)

- [Create collection...](#)
- [Manage collections...](#)

loading



- [Click here to read article using PubReader](#)

## Related citations in PubMed

- Time trends (1998-2007) in brain cancer incidence rates in relation to mobile phone use in England.[*Bioelectromagnetics*. 2011]
- Mobile phone use and glioma risk: comparison of epidemiological study results with incidence trends in the United States.[*BMJ*. 2012]
- Recent cancer trends in the United States.[*J Natl Cancer Inst*. 1995]
- **Review** Systematic review of wireless phone use and brain cancer and other head tumors.[*Bioelectromagnetics*. 2012]
- **Review** Scientific progress - wireless phones and brain cancer: current state of the science.[*MedGenMed*. 2000]

[See reviews...See all...](#)

## Cited by 10 PubMed Central articles

- [The Evangelismos hospital central nervous system tumor registry: Analysis of 1414 cases \(1998-2009\).](#)[Surg Neurol Int. 2013]
  - [Childhood brain tumours and use of mobile phones: comparison of a case-control study with incidence data.](#)[Environ Health. 2012]
  - [Mobile phone use and glioma risk: comparison of epidemiological study results with incidence trends in the United States.](#)[BMJ. 2012]
- 

[See all...](#)

### Related information

- [Related Citations](#)
  - [MedGen](#)
  - [References for this PMC Article](#)
  - [Free in PMC](#)
  - [Cited in PMC](#)
- 

### Recent Activity

[Clear](#)[Turn Off](#)[Turn On](#)

- [Brain cancer incidence trends in relation to cellular telephone use in the Unite...](#)
- 

PubMed

- [wireless and brain tumor in women \(3\)](#)
- 

PubMed

- [Biological effects from electromagnetic field](#)
- 

[Int J Oncol.](#) 2003 Feb;22(2):399-407.

## Further aspects on cellular and cordless telephones and brain tumours.

[Hardell L](#), [Mild KH](#), [Carlberg M](#).

### Source

Department of Oncology, University Hospital, S-701 85 Orebro, Sweden. [lennart.hardell@orebroll.se](mailto:lennart.hardell@orebroll.se)

### Abstract

We included in a case-control study on brain tumours and mobile and cordless telephones 1,617 patients aged 20-80 years of both sexes diagnosed during January 1, 1997 to June 30, 2000. They were alive at the study time and had histopathology verified brain tumour. One matched control to each case was selected from the Swedish Population Register. The study area was the Uppsala-Orebro, Stockholm,

Linköping and Göteborg medical regions of Sweden. Exposure was assessed by a questionnaire that was answered by 1,429 (88%) cases and 1,470 (91%) controls. In total use of analogue cellular telephones gave an increased risk with odds ratio (OR)=1.3, 95% confidence interval (CI)=1.04-1.6, whereas digital and cordless phones did not overall increase the risk significantly. Ipsilateral use of analogue phones gave OR=1.7, 95% CI=1.2-2.3, digital phones OR=1.3, 95% CI=1.02-1.8 and cordless phones OR=1.2, 95% CI=0.9-1.6. The risk for ipsilateral use was significantly increased for astrocytoma for all studied phone types, analogue phones OR=1.8, 95% CI=1.1-3.2, digital phones OR=1.8, 95% CI=1.1-2.8, cordless phones OR=1.8, 95% CI=1.1-2.9. Use of a telephone on the opposite side of the brain was not associated with a significantly increased risk for brain tumours. Regarding anatomical area of the tumour and exposure to microwaves, the risk was increased for tumours located in the temporal area on the same side of the brain that was used during phone calls, significantly so for analogue cellular telephones OR=2.3, 95% CI=1.2-4.1. For acoustic neurinoma OR=4.4, 95% CI=2.1-9.2 was calculated among analogue cellular telephone users. When duration of use was analysed as a continuous variable in the total material, the risk increased per year for analogue phones with OR=1.04, 95% CI=1.01-1.08. For astrocytoma and ipsilateral use the trend was for analogue phones OR=1.10, 95% CI=1.02-1.19, digital phones OR=1.11, 95% CI=1.01-1.22, and cordless phones OR=1.09, 95% CI=1.01-1.19. There was a tendency of a shorter tumour induction period for ipsilateral exposure to microwaves than for contralateral, which may indicate a tumour promotor effect.

PMID:

12527940

[PubMed - indexed for MEDLINE]

### [Publication Types, MeSH Terms](#)

#### **Publication Types**

- [Research Support, Non-U.S. Gov't](#)

#### **MeSH Terms**

- [Adult](#)
- [Aged](#)
- [Aged, 80 and over](#)
- [Astrocytoma/epidemiology](#)
- [Astrocytoma/etiology\\*](#)
- [Brain Neoplasms/epidemiology](#)
- [Brain Neoplasms/etiology\\*](#)
- [Case-Control Studies](#)
- [Cellular Phone\\*/classification](#)
- [Confidence Intervals](#)
- [Equipment Design](#)
- [Female](#)
- [Functional Laterality](#)
- [Glioblastoma/epidemiology](#)
- [Glioblastoma/etiology](#)
- [Habits](#)
- [Humans](#)
- [Logistic Models](#)
- [Male](#)
- [Meningeal Neoplasms/epidemiology](#)
- [Meningeal Neoplasms/etiology\\*](#)
- [Meningioma/epidemiology](#)

- [Meningioma/etiology\\*](#)
- [Microwaves/adverse effects\\*](#)
- [Middle Aged](#)
- [Neoplasms, Radiation-Induced/epidemiology](#)
- [Neoplasms, Radiation-Induced/etiology\\*](#)
- [Neuroma, Acoustic/epidemiology](#)
- [Neuroma, Acoustic/etiology\\*](#)
- [Odds Ratio](#)
- [Questionnaires](#)
- [Radio Waves/adverse effects\\*](#)
- [Registries](#)
- [Risk](#)
- [Single-Blind Method](#)
- [Sweden/epidemiology](#)
- [Telephone\\*](#)
- [Temporal Lobe](#)
- [Time Factors](#)

### **[LinkOut - more resources](#)**

#### **Full Text Sources**

- [Spandidos Publications - PDF](#)

#### **Other Literature Sources**

- [Labome Researcher Resource - ExactAntigen/Labome](#)

#### **Medical**

- [Acne Triad - Genetic Alliance](#)
- [Acoustic Neuroma - MedlinePlus Health Information](#)
- [Brain Cancer - MedlinePlus Health Information](#)

•

### **supplemental Content**



#### **Save items**

[Add to Favorites](#)[View more options](#)

- [Create collection...](#)
- [Manage collections...](#)

loading

### Related citations in PubMed

- Use of cellular telephones and the risk for brain tumours: A case-control study.[Int J Oncol. 1999]
- Mobile phones, cordless phones and the risk for brain tumours.[Int J Oncol. 2009]
- Cellular and cordless telephones and the risk for brain tumours.[Eur J Cancer Prev. 2002]
- **Review** Cell phone use and acoustic neuroma: the need for standardized questionnaires and access to industry data.[Surg Neurol. 2009]
- **Review** Systematic review of wireless phone use and brain cancer and other head tumors.[Bioelectromagnetics. 2012]

[See reviews...See all...](#)

### Cited by 14 PubMed Central articles

- Emerging aspects of mobile phone use.[Emerg Health Threats J. 2009]
- Mobile phones and head tumours. The discrepancies in cause-effect relationships in the epidemiological studies - how do they arise?[Environ Health. 2011]
- How well do adolescents recall use of mobile telephones? Results of a validation study.[BMC Med Res Methodol. 2009]

[See all...](#)

### Related information

- [Related Citations](#)

## **[The probability of developing brain tumours among users of cellular telephones (scientific information to the decision of the International Agency for Research on Cancer (IARC) announced on May 31, 2011)].**

[Article in Russian]

[Grigor'ev IuG.](#)

### Abstract

The WHO's International Agency for Research on Cancer (IARC) has made May 31 2011 PRESS RELEASE No 208 which classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B). The decision is based on an increased risk of glioma, i.e., a malignant type of brain cancer associated with the wireless phone use. This paper reports the analysis of the long-term research on the issue in question that had been carried out in many countries around the world before the decision was made.

PMID:

22279776

[PubMed - indexed for MEDLINE]

### [Publication Types, MeSH Terms](#)

#### Publication Types

- [English Abstract](#)

#### **MeSH Terms**

- [Brain Neoplasms\\*/epidemiology](#)
- [Brain Neoplasms\\*/etiology](#)
- [Cellular Phone\\*](#)
- [Humans](#)
- [Neoplasms, Radiation-Induced\\*/epidemiology](#)
- [Neoplasms, Radiation-Induced\\*/etiology](#)
- [Radio Waves/adverse effects\\*](#)
- [Risk Assessment](#)
- [World Health Organization](#)

#### **[LinkOut - more resources](#)**