

Safeguarding in Schools: Wireless Technologies

March 2014
Dr Sarah Horsley

Safeguarding children is taking action to promote their welfare and protect them from harm (HM Government, 2013, Working together to Safeguard Children). All schools and further education institutions have a statutory duty to safeguard and promote the welfare of children (HM Government, 2007, Statutory guidance on making arrangements to safeguard and promote the welfare of children under section 11 of the Children Act 2004). In their definition of safeguarding Ofsted includes 'preventing impairment of children's and learners' health or development' (Ofsted, 2011). In addition, all schools and further education institutions should create and maintain a safe environment for children and young people (HM Government 2007).

The evidence below describes why the use of wireless devices in schools ought to be considered a safeguarding issue, as it is putting the health or development of pupils at risk.

The information is grouped as follows:

1. Why children and young people are at increased risk
 2. Calls from doctors and scientists to protect children
 3. Damage from Wi-Fi/2.4GHz
 4. Pupils or teachers who exhibit adverse symptoms
 5. Guidance for schools from Public Health England
 6. Concerns
- Appendices 1 and 2.

Mobile communication devices, including mobile phones, Wi-Fi-enabled computers and Wi-Fi access points, emit microwave radiofrequency radiation. Some of the radiation is absorbed by our bodies, producing unwanted side effects. These include damage to fertility, changes in the brain, damage to DNA and possible increased risks of cancers.

1. Why children and young people are at increased risk

Children and young people absorb more microwave, radiofrequency radiation from wireless technologies into their bodies than adults. Modelling studies predict that children absorb 60-100% more into their brains than adults and 900% more into their bone marrow. Children are more likely to be damaged by any effects of wireless signals because their bodies are still developing; cells are dividing more (making damage to DNA more likely to be expressed as mutations); their skulls are thinner and their brains are more conductive, carrying the signals further into the brain. In support of young people being at greater risk, brain tumour studies have found that young people who first used a mobile or cordless phone under the age of 20 had a much greater increased risk of developing a brain tumour than adults (Hardell and Carlberg, 2009; <http://www.spandidos->

publications.com/ijo/35/1/5). Just as medicines have side effects, absorption of microwaves from wireless technologies into the body can result in damage.

2. Calls from doctors and scientists to protect children

The following organizations have all called for children to be protected from the electromagnetic fields from wireless technologies and most have called for Wi-Fi not to be used in schools: The Austrian Medical Association, American Academy of Environmental Medicine, International Commission for Electromagnetic Safety, International Society of Doctors for the Environment, European Environment Agency, Council of Europe, Russian National Committee for Non-Ionizing Radiation Protection, Irish Doctors Environmental Association and Swiss Doctors for Environmental Protection. Many other doctors and scientists have also voiced their concerns (<http://wifiinschools.org.uk/resources/safeschools2012.pdf>). Doctors are calling on people to keep mobile phones away from the body, to reduce the risk of developing breast cancers (<http://www.ktvu.com/videos/news/special-report-keeping-cell-phone-in-bra-may-lead/vhPF8/>).

Official medical advice from the UK Chief Medical Officers is that children under the age of sixteen should be advised to use mobile phones for essential purposes only. Similar maximum specific absorption rates (SARs) for the signals emitted by mobile phones and tablet computers suggest that this recommendation should also apply to wireless tablet computers. For example, average maximum SAR for a sample of 358 digital mobile phones is 1.02 W/Kg in 1g tissue (sarvalues.com; adult); iPad maximum SAR on Wi-Fi is 1.19 W/Kg in 1g tissue (iPad Information Guide; adult). Thus, wireless computers positioned close to the body could expose the users to similar levels of radiation as mobile phones next to the body. Indeed the exposures could be higher than for mobile phones, as wireless computers lack adaptive power control (reduction of power when there is a good base station signal).

Many of the studies that have described damage from wireless technologies exposed the subjects to fairly short durations, such as fifteen minutes, half/one hour a day or a couple of hours a week. Even five minutes exposure to a mobile phone can significantly decrease human sperm motility (Erogul et al, 2006). Malignant brain tumours have been associated with wireless phone use, with a 150% increased risk in adults for the equivalent use of ≥ 40 minutes use a day for 10 years (Hardell et al, 2013; <http://www.spandidos-publications.com/ijo/43/6/1833>). With the increasing use of computers for all subjects, pupils (who are at increased risk compared to adults) are expected in some schools to use a wireless computer for up to 5 hours a day, for 14 years. If the devices are used for homework then the number of hours could be higher. Such chronic exposures to wireless transmitters close to the body may cause more damage to pupils than shorter duration and occasional mobile phone calls, something advised against by the UK Chief Medical Officers.

Please note that the Italian High Court has ruled that an employee's brain tumour was caused by his use of wireless phones for work (2012); an employee in Australia successfully won compensation following illness which was attributed to electromagnetic fields in the workplace (2013). A UK teacher who had to leave work because of the Wi-Fi and mobile phones in school has won an appeal at a Social Entitlement Tribunal at which the Judge

stated that "were it not for electromagnetic radiation the appellant would lead a normal life with little or no functional impairment."

3. Damage from Wi-Fi/2.45 GHz signals

Appendix 1 contains a list of some papers describing damage from Wi-Fi/2.4 GHz signals. Some studies were in humans or human cells and some in animals. Animal studies allow scientists to investigate questions which aren't possible in humans. For example, mobile phone signals during pregnancy were found to significantly decrease the number of ovarian follicles in female offspring by around 30% in mice (Gul et al, 2009; <https://www.ncbi.nlm.nih.gov/pubmed/19241083>). Studies where ovaries are removed to count follicles would not be ethical in humans. But animal studies can act as warnings as well as increasing our understanding. We will have to wait and see whether similar toxic effects on ovaries have occurred in the current generation of girls, if their mothers used wireless devices during pregnancy.

Studies into the safety of Wi-Fi have found similar damaging effects to those already described in the scientific literature for mobile phones. Wi-Fi/2.4 GHz signals increase oxidative stress, which is an increase in free radical damage caused by increased production of radicals or a decrease in their removal by antioxidants. Increased free radical concentrations can damage cell membranes, proteins, RNA and DNA in the body. Increased oxidative stress and damage to DNA is described in several of the papers in Appendices 1 and 2.

Another effect of Wi-Fi signals is damage to male fertility. Effects described include decreased sperm motility, decreased sperm counts, sperm head abnormalities, DNA damage, decreased tubule diameters and weights and increased oxidative stress. Concern was expressed by Redmayne and colleagues in *Reproductive Toxicology* (2011), 'There is sufficient evidence, supported by recommendations from fertility researchers and governmental bodies, to make it advisable for schools to have and enforce policies that remove cell phones from students' pockets during school.' There is now a great deal of evidence for wireless technologies damaging male fertility, with around 80% of studies describing harm. There are methodological reasons why effects were not observed in some papers, which may account for damage not being found in 100% of studies. For male staff who want to father children, wireless devices are a potential hazard, especially as signals can damage sperm DNA, the genetic material required for the next generation. Prolonged exposures to Wi-Fi (1 year) have resulted in decreased diameters of seminiferous tubules and decreased weights of epididymis and seminal vesicles, indicating that fertility may be permanently decreased in males, especially if exposures are during puberty when the body is growing (Dasdag et al, 2014; <http://www.ncbi.nlm.nih.gov/pubmed/24460421>).

For female fertility, any DNA damage in the ovaries of female pupils or teachers could lead to genetic abnormalities in their future children, and further generations. Transmitters in wireless computers and mobile phones kept in pockets can be close to reproductive organs. In mice, Wi-Fi 2.4 GHz signals reduced implantation of pregnancies and increased DNA damage in brain cells of offspring (Shahin et al, 2013; <http://www.ncbi.nlm.nih.gov/pubmed/23334843>). Mobile phone or Wi-Fi signals during

pregnancy have been found to cause abnormalities in the offspring of animals, including hyperactivity, decreased fertility, altered brain development, reduced postnatal growth, increased oxidative stress and decreased cognitive abilities (Sangun et al, 2014; <https://www.ncbi.nlm.nih.gov/pubmed/24460416>; Gul et al, 2009; <https://www.ncbi.nlm.nih.gov/pubmed/19241083>; Odaci et al, 2008; <https://www.ncbi.nlm.nih.gov/pubmed/18761003>; Razavinasab et al, 2014; <https://www.ncbi.nlm.nih.gov/pubmed/24604340>; Haghani et al, 2013; <https://www.ncbi.nlm.nih.gov/pubmed/23906636>; Kokturk et al, 2013; <https://www.ncbi.nlm.nih.gov/pubmed/23935717>; Ragbetli et al, 2010; <https://www.ncbi.nlm.nih.gov/pubmed/20545571>). A study from Yale University found that mobile phone exposure in pregnancy altered brain development, damaged memory and increased hyperactivity in the offspring (Aldad et al, 2012; <http://www.ncbi.nlm.nih.gov/pubmed/22428084>). There is an association between mobile phone use in human mothers during pregnancy and behavioural problems in children (Divan et al, 2012 <http://www.ncbi.nlm.nih.gov/pubmed/21138897>; Divan et al, 2008 <http://www.ncbi.nlm.nih.gov/pubmed/18467962>). The Russian National Committee for Non-ionizing Radiation Protection advises pregnant women not to use a mobile phone because of possible effects on developing fetuses.

Brain activity and cognition. Wi-Fi signals alter human brain activity, even at low exposures (0.5 V/m electrical field strength). Wi-Fi access points in schools are likely to be exposing some children to 0.5 V/m signals and those from computers in use will be higher than this. In young women there was found to be a decrease in alpha and beta wave energies in the EEG measurements and in young men a decrease in electrical responses (a measure of attention) during a working memory task (Papageorgiou et al, 2011 <http://www.ncbi.nlm.nih.gov/pubmed/21714138>; Maganioti et al, 2010). Working memory is an important cognitive skill that schools would not want to compromise in pupils at school: keeping information “online” whilst carrying out a task. Chronic exposures to low-powered mobile phone signals have been found to damage learning and memory in animal studies, even from as little as two hour exposures per week (Nittby et al, 2008 <http://www.ncbi.nlm.nih.gov/pubmed/18044737>; also Fragopoulou et al, 2010 <https://www.ncbi.nlm.nih.gov/pubmed/19954937>; Narayanan et al, 2009 <https://www.ncbi.nlm.nih.gov/pubmed/19330250>; Li et al, 2008 <https://www.ncbi.nlm.nih.gov/pubmed/18198477>; Deshmukh et al, 2013 <http://www.ncbi.nlm.nih.gov/pubmed/23720885>; Megha et al, 2012 <http://www.ncbi.nlm.nih.gov/pubmed/23986973>). Some human studies report poorer performance in cognitive tests, decreased attention and increased reaction times (Leung et al, 2011 <https://www.ncbi.nlm.nih.gov/pubmed/21570341>; Luria et al, 2009 <https://www.ncbi.nlm.nih.gov/pubmed/19194860>; Krause et al, 2006 <https://www.ncbi.nlm.nih.gov/pubmed/16846979>; Maier et al, 2004 <https://www.ncbi.nlm.nih.gov/pubmed/15180806>; Cao et al, 2000 <https://www.ncbi.nlm.nih.gov/pubmed/12725088>).

If the wireless devices which schools are using damage cognition, then they may not be improving learning outcomes for pupils. As Wi-Fi signals have been found to alter human brain activity, with possible damaging effects on cognition, there may be challenges from parents in the future if their children do not perform well in examinations when the Wi-Fi is

switched on. Whilst we do not yet know what the long term effects of chronically altering brain activity in children and young people will be, we do know that it is likely to alter brain development, as the electrical activity of the brain determines how the brain develops. The brain continues to develop until the early twenties, but remains 'plastic' (altered by experiences) in adulthood. Mobile phone signals have also been associated with dead cells in the brain (e.g. Salford et al, 2003 <https://www.ncbi.nlm.nih.gov/pubmed/12782486>; Bas et al, 2009 <https://www.ncbi.nlm.nih.gov/pubmed/19230827>; Odaci et al, 2008 <https://www.ncbi.nlm.nih.gov/pubmed/18761003>; Sonmez et al, 2010 <https://www.ncbi.nlm.nih.gov/pubmed/20691167>; Kokturk et al, 2013 <https://www.ncbi.nlm.nih.gov/pubmed/23935717>; Maskey et al, 2010 <https://www.ncbi.nlm.nih.gov/pubmed/20546709>). Over time, it is possible that this could manifest as early-onset dementia or other neurological disorders.

Wi-Fi/2.4 GHz signals increase the proliferation of human leukaemia cells (Naziroglu et al, 2012 <http://www.ncbi.nlm.nih.gov/pubmed/22489926>). Increasing the growth of cancer cells is obviously not beneficial for anyone with cancer.

Wi-Fi signals for one hour a day were found to induce a glucose metabolism disorder in rats, suggesting a diabetes-like condition, plus oxidative stress (Salah et al, 2013 <https://www.ncbi.nlm.nih.gov/pubmed/23994945>). Incidence of diabetes in the UK has approximately doubled in the past twenty years.

Also attached (Appendix 2) is a list of 100 papers which describe damage from mobile phone and similar wireless signals. These are only a tiny fraction of the papers describing adverse effects, but they should illustrate the point that there is a problem with their safety.

Scientific myths abound on the internet, such as 'non-ionizing radiofrequency radiation cannot cause biological damage as it doesn't have enough energy to directly break molecular bonds'. However, adverse biological effects and damage can occur without bonds being broken. A wide range of biological processes involve movement of charge or changes in the orientation of molecules.

4. Pupils or teachers who exhibit adverse symptoms

Many of the possible adverse effects described in section 3 could occur without obvious clinical symptoms, maybe for years, before manifesting as illness or disease. However, at some point schools may have pupils or teachers who react to wireless signals with immediate adverse symptoms, such as tachycardia, arrhythmias (Havas et al 2010; Havas and Marrongelle 2013 <https://www.ncbi.nlm.nih.gov/pubmed/23675629>), epileptic seizures (iPad manual), headaches (Sudan et al, 2012 <https://www.ncbi.nlm.nih.gov/pubmed/23750182>) or malfunctioning of heart defibrillators or pacemakers. All pupils need access to the curriculum and teachers require safe working conditions.

The adverse effects of wireless signals on human haemoglobin (decreasing its ability to carry oxygen by altering its tertiary structure; Mousavy et al, 2009 <https://www.ncbi.nlm.nih.gov/pubmed/19263507>) may decrease cognition and academic performance, increase cell death or the incidence of fainting.

5. Guidance for schools from Public Health England (PHE)

PHE currently advise schools that there is no reason why Wi-Fi should not be used, based on exposures being lower than for mobile phones, that they are lower than current ICNIRP guideline exposure values (<http://www.icnirp.de/PubEMF.htm>), and that the AGNIR 2012 report commissioned by them concluded that there was no convincing evidence of any effects of radiofrequency radiation below ICNIRP guideline values (http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317133826368).

However, there are weaknesses in all of these points. Exposures from wireless computers can be as high as for mobile phones (as described above) and may be used for much longer periods of time. The current ICNIRP guidelines have been called obsolete by the European Environment Agency, European Parliament, Council of Europe, International Commission for Electromagnetic Safety, American Academy of Environmental Medicine and others. If exposures below ICNIRP values were safe, none of the papers listed in Appendices 1 or 2 would have found any adverse effects.

The AGNIR 2012 report left out a large number of relevant papers. In addition, the conclusions did not reflect the science included in the report. For example, twenty three papers were included on male fertility (at least 15 were left out) and 78% of these reported decreased measures of male fertility or damage to sperm. Yet the conclusion was that there was no convincing evidence of effects of radiofrequency radiation on male fertility. Professor Leszczynski from the Finnish Radiation Protection Authority called the report 'biased and misleading'. None of the studies in Appendix 1 were included in the report. The WHO International Agency for Research on Cancer has said that there **is** evidence of effects of radiofrequency radiation on immune function, gene and protein expression, cell signalling, oxidative stress, apoptosis (cell death), effects on the blood-brain barrier, on the brain, as well as damage to genetic material through genotoxicity (Non-ionizing and Ionizing Radiations: Recent Highlights. Fatiha EL Ghissassi on behalf of the IARC Monograph Programme, January 2014).

PHE have not carried out any biological or health studies into the possible effects of Wi-Fi since announcing seven years ago that they would thoroughly investigate the safety of Wi-Fi for schools. PHE have simply measured radiofrequency exposures at 0.5-1 metre away from wireless laptops. They have not tested the radiation from wireless tablet computers or distances closer than 0.5 metres.

6. Concerns

Improving the safety of communications equipment in schools doesn't mean stopping excellent information technology (IT) resources being used for the benefit of pupils. It simply means changing from communication via microwaves to communication via shielded wiring. By making this change schools can be safe places for pupils and staff, safeguarding the health or development of children and young people.

Some parents feel that given the possible damaging effects of wireless signals, it would be morally wrong for them to provide a wireless device for their children to use. However, the

widespread and involuntary use of wireless technologies in schools mean that parents no longer have a choice about their children's safety in school.

In the TUC 'Occupational Cancer, A Workplace Guide' (2008, 2012; <http://www.tuc.org.uk/sites/default/files/extras/occupationalcancer.pdf>), it advises employers that all class 1 and 2 carcinogens should be removed from the workplace or caution used to prevent exposure to them. Mobile phone and Wi-Fi signals have been classified as a class 2B possible human carcinogen by the WHO International Agency for Research on Cancer (2011; <http://monographs.iarc.fr/ENG/Monographs/vol102/index.php>). It is surprising how many people consider exposing children to a possible carcinogen in school every day is completely acceptable.

Pupils could use wired computers in class to access the internet, with no loss of the educational benefits of computers in school. Computers connected with Ethernet or fibre optic cables and the Wi-Fi on the computer switched off do not expose the users to radiofrequency radiation. Admittedly, wired computers are more inconvenient than wireless, but damage to the development, health or fertility of pupils and genetic abnormalities in their offspring are far, far more inconvenient than using wires for computers.

For schools that currently use wireless technologies, the evidence of possible damage to pupils or teachers may be inconvenient and challenging. It is difficult to make changes. However, the scientific evidence is nonetheless real and taking no action will not make the science or potential damage disappear. It is important for all of us to prevent children or young people being harmed, where we see that harm might be taking place.

Appendix 1,

A list of some Wi-Fi/2.4GHz papers:

Atasoy H.I. et al, 2013. Immunohistopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices. *Journal of Pediatric Urology* 9(2): 223-229. <http://www.ncbi.nlm.nih.gov/pubmed/22465825>

Avendaño C. et al, 2012. Use of laptop computers connected to internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation. *Fertility and Sterility* 97(1): 39-45. <http://www.ncbi.nlm.nih.gov/pubmed/22112647>

Aynali G. et al, 2013. Modulation of wireless (2.45 GHz)-induced oxidative toxicity in laryngotracheal mucosa of rat by melatonin. *Eur Arch Otorhinolaryngol* 270(5): 1695-1700. <http://www.ncbi.nlm.nih.gov/pubmed/23479077>

Dasdag S. et al, 2014. Effect of long-term exposure of 2.4 GHz radiofrequency radiation emitted from Wi-Fi equipment on testes functions. *Electromagn Biol Med*. Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/24460421>

Gumral N. et al, 2009. Effects of selenium and L-carnitine on oxidative stress in blood of rat induced by 2.45-GHz radiation from wireless devices. *Biol Trace Elem Res*. 132(1-3): 153-163. <http://www.ncbi.nlm.nih.gov/pubmed/19396408>

Havas M. et al, 2010. Provocation study using heart rate variability shows microwave radiation from 2.4GHz cordless phone affects autonomic nervous system. *European Journal of Oncology Library Vol.* 5: 273-300. <http://www.icems.eu/papers.htm?f=/c/a/2009/12/15/MNHJ1B49KH.DTL> part 2.

Havas M. and Marrongelle J. 2013. Replication of heart rate variability provocation study with 2.45GHz cordless phone confirms original findings. *Electromagn Biol Med* 32(2): 253-266. <https://www.ncbi.nlm.nih.gov/pubmed/23675629>

Maganioti A. E. et al, 2010. Wi-Fi electromagnetic fields exert gender related alterations on EEG. 6th International Workshop on Biological Effects of Electromagnetic fields. <http://www.istanbul.edu.tr/6internatwshopbioeffemf/cd/pdf/poster/WI-FI%20ELECTROMAGNETIC%20FIELDS%20EXERT%20GENDER.pdf>

Margaritis L.H. et al, 2013. Drosophila oogenesis as a bio-marker responding to EMF sources. *Electromagn Biol Med*., Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/23915130>

Naziroğlu M. and Gumral 2009. Modulator effects of L-carnitine and selenium on wireless devices (2.45 GHz)-induced oxidative stress and electroencephalography records in brain of rat. *Int J Radiat Biol*. 85(8): 680-689. <http://www.ncbi.nlm.nih.gov/pubmed/19637079>

Naziroğlu M. et al, 2012. 2.45-Gz wireless devices induce oxidative stress and proliferation through cytosolic Ca²⁺ influx in human leukemia cancer cells. *International Journal of Radiation Biology* 88(6): 449–456. <http://www.ncbi.nlm.nih.gov/pubmed/22489926>

Naziroğlu M. et al, 2012b. Melatonin modulates wireless (2.45 GHz)-induced oxidative injury through TRPM2 and voltage gated Ca²⁺ channels in brain and dorsal root ganglion in rat. *Physiol Behav*. 105(3): 683-92. <http://www.ncbi.nlm.nih.gov/pubmed/22019785>

Ozorak A. et al, 2013. Wi-Fi (2.45 GHz)- and mobile phone (900 and 1800 MHz)- induced risks on oxidative stress and elements in kidney and testis of rats during pregnancy and the development of offspring. Biol Trace Elem Res, Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/24101576>

Oksay T. et al, 2012. Protective effects of melatonin against oxidative injury in rat testis induced by wireless (2.45 GHz) devices. Andrologia doi: 10.1111/and.12044, Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/23145464>

Papageorgiou C. C. et al, 2011. Effects of Wi-Fi signals on the p300 component of event-related potentials during an auditory haying task. Journal of Integrative Neuroscience 10(2): 189-202. <http://www.ncbi.nlm.nih.gov/pubmed/21714138>

Salah MB, 2013. Effects of olive leave extract on metabolic disorders and oxidative stress induced by 2.45 GHz WIFI signals. Environ Toxicol Pharmacol 36(3): 826-834. <https://www.ncbi.nlm.nih.gov/pubmed/23994945>

Shahin S. et al, 2013. 2.45 GHz Microwave Irradiation-Induced Oxidative Stress Affects Implantation or Pregnancy in Mice, Mus musculus. Appl Biochem Biotechnol 169: 1727–1751. <http://www.ncbi.nlm.nih.gov/pubmed/23334843>

Shahin S. et al, 2014. Microwave irradiation adversely affects reproductive function in male mouse, Mus musculus, by inducing oxidative and nitrosative stress. Free Radic Res. Epub ahead of print. <https://www.ncbi.nlm.nih.gov/pubmed/24490664>

Shangun O. et al., 2014. The effects of long-term exposure to a 2450MHz electromagnetic field on growth and pubertal development in female Wistar rats. Electromagn Biol Med. Epub ahead of print. <https://www.ncbi.nlm.nih.gov/pubmed/24460416>

Tök L. et al, 2014. Effects of melatonin on Wi-Fi-induced oxidative stress in lens of rats. Indian Journal of Ophthalmology 62(1): 12-15. <http://www.ncbi.nlm.nih.gov/pubmed/24492496>

Türker Y. et al, 2011. Selenium and L-carnitine reduce oxidative stress in the heart of rat induced by 2.45-GHz radiation from wireless devices. Biol Trace Elem Res. 143(3): 1640-1650. <http://www.ncbi.nlm.nih.gov/pubmed/21360060>

Appendix 2

A list of 100 example mobile phone and other wireless signal papers (there are many more).

Aalto S. et al, 2006. Mobile phone affects cerebral blood flow in humans. *J Cereb Blood Flow Metab* 26(7):885-890. <http://www.ncbi.nlm.nih.gov/pubmed/16495939>

Aboul E. et al, 2013. The effect of pulsed electromagnetic radiation from mobile phone on the levels of monoamine neurotransmitters in four different areas of rat brain. *Eur Rev Med Pharmacol Sci* 17(13): 1782-1788. <https://www.ncbi.nlm.nih.gov/pubmed/23852905>

Abu Khadra K.M. et al, 2014. Evaluation of selected biochemical parameters in the saliva of young males using mobile phones. *Electromagn Biol Med Epub ahead of print*.
<https://www.ncbi.nlm.nih.gov/pubmed/24499288>

Agarwal A. et al, 2008. Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study, *Fertil Steril* 89, 124-128.
<https://www.ncbi.nlm.nih.gov/pubmed/17482179>

Agarwal A. et al, 2009. Effects of radiofrequency electromagnetic waves (RF-EMW) from cellular phones on human ejaculated semen: an in vitro pilot study, *Fertility and Sterility* 92, 1318-1325.
<https://www.ncbi.nlm.nih.gov/pubmed/18804757>

Aitken R. J. et al, 2005, Impact of radio frequency electromagnetic radiation on DNA integrity in the male germline, *Int J Androl*, 28(3), 171-179. <https://www.ncbi.nlm.nih.gov/pubmed/15910543>

Aldad T.S. et al, 2012. Fetal Radiofrequency Radiation Exposure From 800-1900 Mhz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice. *Nature Scientific reports* 2: 312.
<https://www.ncbi.nlm.nih.gov/pubmed/?term=aldad+ts+AND+2012>

Alhousseiny A. et al, 2012. Electromagnetic energy radiated from mobile phone alters electrocardiographic records of patients with ischemic heart disease. *Ann Med Health Sci Res* 2(2): 146-151. <http://www.ncbi.nlm.nih.gov/pubmed/23440607>

Balmori A. 2010. Mobile phone mast effects on common frog (*Rana temporaria*) tadpoles: the city turned into a laboratory. *Electromagn. Biol. Med.* 29(1-2):31-35.
<http://www.ncbi.nlm.nih.gov/pubmed/20560769>

Bartsch H. et al, 2010. Effect of chronic exposure to a GSM-like signal (mobile phone) on survival of female Sprague-Dawley rats: Modulatory effects by month of birth and possibly stage of the solar cycle. *Neuroendocrinology Letters* 31(4):457-473. <https://www.ncbi.nlm.nih.gov/pubmed/20802457>

Bas O. et al, 2009. 900MHz electromagnetic field exposure affects qualitative and quantitative features of hippocampal pyramidal cells in the adult female rat, *Brain Research* 1265:178-85.
<https://www.ncbi.nlm.nih.gov/pubmed/19230827>

Bas O. et al, 2009b. Chronic prenatal exposure to the 900 megahertz electromagnetic field induces pyramidal cell loss in the hippocampus of newborn rats. *Toxicol Ind Health* 25(6): 377-384.
<https://www.ncbi.nlm.nih.gov/pubmed/19671630>

- Belyaev I. Y. et al, 2005. 915MHz microwaves and 50Hz magnetic field affect chromatin conformation and 53BP1 foci in human lymphocytes from hypersensitive and healthy persons, *Bioelectromagnetics* 26(3), 173-184. <https://www.ncbi.nlm.nih.gov/pubmed/15768430>
- Bise W. 1978. Low power radiofrequency and microwave effects on human electroencephalogram and behaviour. *Physiol. Chem. & Physics* 10: 387-398. <https://www.ncbi.nlm.nih.gov/pubmed/?term=Bise+AND+1978>
- Blank M. and Goodman R. 2009. Electromagnetic fields stress living cells. *Pathophysiology* 16(2-3): 71-78. <https://www.ncbi.nlm.nih.gov/pubmed/19268550>
- Burch J.B. et al, 2002. Melatonin metabolite excretion among cellular telephone users. *Int J Radiat Biol* 78(11): 1029-1036. <https://www.ncbi.nlm.nih.gov/pubmed/12456290>
- Cam S.T. and Seyhan N. 2012. Single-strand DNA breaks in human hair root cells exposed to mobile phone radiation. *International Journal of Radiation Biology* 88(5): 420-424. <https://www.ncbi.nlm.nih.gov/pubmed/22348707>
- De Iuliis G. N. et al, 2009. Mobile phone radiation induces reactive oxygen species production and DNA damage in human spermatozoa in vitro, *PLoS One* 4(7), e6446. <https://www.ncbi.nlm.nih.gov/pubmed/19649291>
- Desai N. R. et al, 2009. Pathophysiology of cell phone radiation: oxidative stress and carcinogenesis with focus on male reproductive system, *Reproductive Biology and Endocrinology* 7, 114. <https://www.ncbi.nlm.nih.gov/pubmed/19849853>
- Deshmukh P.S. et al, 2013. Effect of low level microwave radiation exposure on cognitive function and oxidative stress in rats. *Ind J Biochem Biophys* 50(2): 114-119. <http://www.ncbi.nlm.nih.gov/pubmed/23720885>
- Divan H. A. et al, 2008. Prenatal and postnatal exposure to cell phone use and behavioural problems in children, *Epidemiology* 19, 523-529. <https://www.ncbi.nlm.nih.gov/pubmed/18467962>
- Divan H.A. et al, 2010. Cell phone use and behavioural problems in young children. *J Epidemiol Community Health* 66(6): 524-529. <https://www.ncbi.nlm.nih.gov/pubmed/21138897>
- Eberhardt J.L. et al, 2008. Blood-Brain Barrier Permeability and Nerve Cell Damage in Rat Brain 14 and 28 Days After Exposure to Microwaves from GSM Mobile Phones. *Electromag Biol Med* 27(3): 215-229. <https://www.ncbi.nlm.nih.gov/pubmed/18821198>
- El-Bediwi A.B. et al, 2013. Influence of electromagnetic radiation produced by mobile phone on some biophysical blood properties in rats. *Cell Biochem Biophys* 65(3): 297-300. <http://www.ncbi.nlm.nih.gov/pubmed/23054912>
- Erdinc O. O. et al, 2003. Electromagnetic waves of 900MHz in acute pentylenetetrazole model in ontogenesis in mice. *Neurol. Sci.* 24:111-116. <http://www.ncbi.nlm.nih.gov/pubmed/14600821>
- Erogul O. et al, 2006. Effects of electromagnetic radiation from a cellular phone on human sperm motility: an in vitro study. *Archives of Medical Research* 37: 840-843. <https://www.ncbi.nlm.nih.gov/pubmed/16971222>

- Eskander E.F. et al, 2011. How does long term exposure to base stations and mobile phones affect human hormone profiles? *Clinical Biochemistry* 45(1-2): 157-161. <https://www.ncbi.nlm.nih.gov/pubmed/22138021>
- Fesenko E. E. et al., 1999. Stimulation of murine natural killer cells by weak electromagnetic waves in the centimeter range. *Biofizika* 44:737–741. <http://www.ncbi.nlm.nih.gov/pubmed/10544828>
- Fesenko E. E. et al., 1999. Microwaves and cellular immunity. I. Effect of whole body microwave irradiation on tumor necrosis factor production in mouse cells, *Bioelectrochem. Bioenerg.* 49:29–35. <http://www.ncbi.nlm.nih.gov/pubmed/10619445>
- Fragopoulou A. F. et al, 2009. Whole body exposure with GSM 900MHz affects spatial memory in mice *Pathophysiology* 17(3): 179-187. <https://www.ncbi.nlm.nih.gov/pubmed/22138021>
- Fragopoulou A.F. and Margaritis L.H. 2010. Is cognitive function affected by mobile phone radiation exposure? *Eur J Oncol Library* 5: 261–72.
- Fragopoulou A.F. et al, 2011. Brain proteome response following whole body exposure of mice to mobile phone or wireless DECT base radiation. *Electromagnetic Biology and Medicine* 31(4): 250-274. <https://www.ncbi.nlm.nih.gov/pubmed/22263702>
- Gul A. et al, 2009. The effects of microwave emitted by cellular phones on ovarian follicles in rats, *Arch Gynecol Obstet* 280, 729-733. <https://www.ncbi.nlm.nih.gov/pubmed/19241083>
- Haghani M et al, 2013. Maternal mobile phone exposure adversely affects the electrophysiological properties of Purkinje neurons in rat offspring. *Neuroscience* 250:588-598. <https://www.ncbi.nlm.nih.gov/pubmed/23906636>
- Hamzany Y. et al, 2013. Is Human Saliva an Indicator of the Adverse Health Effects of Using Mobile Phones? *Antioxid. Redox Signal.* 18, 622–627. <https://www.ncbi.nlm.nih.gov/pubmed/22894683>
- Hardell L. et al, 2007. Long-term use of cellular phones and brain tumours: increased risk associated with use for >10 years. *Occup Environ Med* 64, 626-632. <https://www.ncbi.nlm.nih.gov/pubmed/17409179>
- Hardell L. and Carlberg M. 2009. Mobile phones, cordless phones and the risk for brain tumours. *International Journal of Oncology* 35: 5-17. <https://www.ncbi.nlm.nih.gov/pubmed/19513546>
- Hardell L. 2010. Wireless phone use and brain tumour risk. *Eur J Oncol Library* 5: 363–78.
- Hardell L. et al, 2013. Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones. *Int J Oncol* 43(4): 1036-1044. <https://www.ncbi.nlm.nih.gov/pubmed/23877578>
- Hardell L. et al, 2013. Case-control study of the association between malignant brain tumours diagnosed between 2007 and 2009 and mobile and cordless phone use. *Int J Oncol* 43(6): 1833-1845. <https://www.ncbi.nlm.nih.gov/pubmed/24064953>
- Johansson O. 2009. Disturbance of the immune system by electromagnetic fields—A potentially underlying cause for cellular damage and tissue repair reduction which could lead to disease and impairment. *Pathophysiology* 16(2–3): 157–77. <https://www.ncbi.nlm.nih.gov/pubmed/19398310>

- Karaca E. et al, 2011. The genotoxic effect of radiofrequency waves on mouse brain. *J. Neurooncol* 106(1): 53-58. <https://www.ncbi.nlm.nih.gov/pubmed/21732071>
- Kesari K. K. and Behari J., 2009. Microwave exposure affecting reproductive system in male rats. *Appl. Biochem. Biotechnol.* 162(2):416-428. <http://www.ncbi.nlm.nih.gov/pubmed/19768389>
- Kesari K. K. and Behari J., 2009. Fifty-gigahertz microwave exposure effect of radiations on rat brain. *Appl. Biochem. Biotechnol.* 158:126-139. <http://www.ncbi.nlm.nih.gov/pubmed/19089649>
- Kesari KK et al, 2010. Mutagenic response of 2.45 GHz radiation exposure on rat brain. *Ind J Radiat Biol* 86(4): 334-343. <https://www.ncbi.nlm.nih.gov/pubmed/20353343>
- Kesari KK et al, 2013. Biophysical evaluation of radiofrequency electromagnetic field effects on male reproductive pattern. *Cell Biochem Biophys* 65(2): 85-96. <https://www.ncbi.nlm.nih.gov/pubmed/22926544>
- Ketabi N. et al, 2013. Electromagnetic fields (UHF) increase voltage sensitivity of membrane ion channels; possible indication of cell phone effect on living cells. *Electromagn Biol Med.* Epub ahead of print. <https://www.ncbi.nlm.nih.gov/pubmed/24236537>
- Khadra A. et al, 2014. Evaluation of selected biochemical parameters in the saliva of young males using mobile phones. *Electromagn Biol Med.* Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/24499288>
- Khurana V. G. et al., 2010. Epidemiological Evidence for a Health Risk from Mobile Phone Base Stations. *Int. J. Occup. Environ. Health* 16:263–267. <http://www.ncbi.nlm.nih.gov/pubmed/20662418>
- Koturk S. et al, 2013. Effect of Lycopersicon esculentum extract on apoptosis in the rat cerebellum, following prenatal and postnatal exposure to an electromagnetic field. *Exp Ther Med* 6(1): 52-56. <https://www.ncbi.nlm.nih.gov/pubmed/23935717>
- Krause C.M. et al, 2006. Mobile phone effects on children's event-related oscillatory EEG during an auditory memory task. *Int J Radiat Biol* 82(6): 443-450. <https://www.ncbi.nlm.nih.gov/pubmed/16846979>
- Kwon M.S. et al, 2011. GSM mobile phone radiation suppresses brain glucose metabolism. *J Cereb Blood Flow Metab* 31(12):2293-2301. <http://www.ncbi.nlm.nih.gov/pubmed/21915135>
- Lai H. and Singh N. P., 1997. Melatonin and a spin-trap compound block radiofrequency electromagnetic radiation-induced DNA strand breaks in rat brain cells, *Bioelectromagnetics* 18(6), 446-454. <https://www.ncbi.nlm.nih.gov/pubmed/9261542>.
- Leung S. et al, 2011. Effects of 2G and 3G mobile phones on performance and electrophysiology in adolescents, young adults and older adults. *Clin Neurophysiol* 122(11): 2203-2216. <https://www.ncbi.nlm.nih.gov/pubmed/21570341>.
- Li M. et al, 2008. Elevation of plasma corticosterone levels and hippocampal glucocorticoid receptor translocation in rats: a potential mechanism for cognition impairment following chronic low-power-density microwave exposure, *J. Radiat Res* 49(2), 163-170. <https://www.ncbi.nlm.nih.gov/pubmed/18198477>

- Lopez-Martin E. et al, 2006. GSM radiation triggers seizures and increases cerebral c-fos positivity in rats pretreated with subconvulsive doses of picrotoxin, *Neuroscience Letters* 398, 139-144. <https://www.ncbi.nlm.nih.gov/pubmed/16448750>
- Loughran S.P. et al, 2011. Individual Differences in the Effects of Mobile Phone Exposure on Human Sleep: Rethinking the Problem. *Bioelectromagnetics* 33(1): 86-93. <https://www.ncbi.nlm.nih.gov/pubmed/21812009>
- Lu Y.S. et al, 2012. Reactive oxygen species formation and apoptosis in human peripheral blood mononuclear cell induced by 900 MHz mobile phone radiation. *Oxid Med Cell Longev* Epub ahead of print. <http://www.ncbi.nlm.nih.gov/pubmed/22778799>
- Luria R. et al, 2009. Cognitive effects of radiation emitted by cellular phones: the influence of exposure side and time. *Bioelectromagnetics* 30(3): 198-204. <https://www.ncbi.nlm.nih.gov/pubmed/19194860>
- Lyaginskaja A.M. et al, 2010. Study of the influence of blood serum from rats exposed to low-level electromagnetic fields on pregnancy and fetal and offspring development. *Biophysics* 55(6): 1059–66.
- Magras I.N. and Xenos T.D., 1997. RF radiation-induced changes in the prenatal development of mice. *Bioelectromagnetics* 18(6): 455-461. <https://www.ncbi.nlm.nih.gov/pubmed/9261543>
- Maier R. et al., 2004. Effects of pulsed electromagnetic fields on cognitive processes – a pilot study on pulsed field interference with cognitive regeneration. *Acta Neurologica Scandinavica* 110: 46-52. <http://www.ncbi.nlm.nih.gov/pubmed/15180806>
- Marková E. et al, 2010. Microwaves from Mobile Phones Inhibit 53BP1 Focus Formation in Human Stem Cells More Strongly Than in Differentiated Cells: Possible Mechanistic Link to Cancer Risk. *Environmental Health Perspectives* 118: 394-399. <https://www.ncbi.nlm.nih.gov/pubmed/20064781>
- Maskey D. Et al, 2010. Chronic 835-MHz radiofrequency exposure to mice hippocampus alters the distribution of calbindin and GFAP immunoreactivity. *Brain Research* 1346: 237-246. <https://www.ncbi.nlm.nih.gov/pubmed/20546709>
- Megha K. et al, 2012. Microwave radiation induced oxidative stress, cognitive impairment and inflammation in brain of Fischer rats. *Ind J Exp Biol* 50(12):889-896. <http://www.ncbi.nlm.nih.gov/pubmed/23986973>
- Meo S.A and Rubeaan K. 2013. Effects of exposure to electromagnetic field radiation (EMFR) generated by activated mobile phones on fasting blood glucose. *Int J Occup Med Environ Health* 26(2): 235-241. <http://www.ncbi.nlm.nih.gov/pubmed/23771861>
- Mousavy S.J. et al, 2009. Effects of mobile phone radiofrequency on the structure and function of the normal human haemoglobin. *Int J Biol Macromol* 44: 278–85. <https://www.ncbi.nlm.nih.gov/pubmed/19263507>
- Narayanan S.N. et al, 2009. Spatial memory performance of wistar rats exposed to mobile phone. *CLINICS* 64(3): 231-4. <https://www.ncbi.nlm.nih.gov/pubmed/19330250>

Narayanan S.N. et al, 2010. Effect of radio-frequency electromagnetic radiations (RF-EMR) on passive avoidance behaviour and hippocampal morphology in Wistar rats. *Upsala Journal of Medical Sciences*. 115: 91–96. <https://www.ncbi.nlm.nih.gov/pubmed/20095879>

Nittby H. et al., 2008. Cognitive impairment in rats after long-term exposure to GSM-900 mobile phone radiation. *Bioelectromagnetics* 29: 219-232. <http://www.ncbi.nlm.nih.gov/pubmed/18044737>

Nittby H. et al, 2008b. Radiofrequency and extremely low-frequency electromagnetic field effects on the blood-brain barrier, *Electromagnetic Biology and Medicine*, 27, 103-126. <https://www.ncbi.nlm.nih.gov/pubmed/18568929>

Nittby H. et al, 2009. Increased blood-brain barrier permeability in mammalian brain 7 days after exposure to the radiation from a GSM-900 mobile phone. *Pathophysiology* 16(2-3): 103-112. <https://www.ncbi.nlm.nih.gov/pubmed/19345073>

Novoselova E. G. et al., 1998. Stimulation of production of tumor necrosis factor by murine macrophages when exposed in vivo and in vitro to weak electromagnetic waves in the centimeter range *Bofizika* 43:1132–1333.

Novoselova E. G. et al., 1999. Microwaves and cellular immunity. II. Immunostimulating effects of microwaves and naturally occurring antioxidant nutrients. *Bioelectrochem. Bioenerg.* 49:37–41. <http://www.ncbi.nlm.nih.gov/pubmed/10619446>

Ntzouni M.P. et al, 2010. Short-term memory in mice is affected by mobile phone radiation. *Pathophysiology* 18(3): 193-199. <https://www.ncbi.nlm.nih.gov/pubmed/21112192>

Ntzouni M.P. et al, 2013. Transient and cumulative memory impairments induced by GSM 1.8 GHz cell phone signal in a mouse model. *Electromagn Biol Med* 32(1):95-120. <https://www.ncbi.nlm.nih.gov/pubmed/23320614>

Odaci E. et al, 2008. Effects of exposure to a 900MHz electromagnetic field on the dentate gyrus: a stereological and histopathological study, *Brain Research* 1238, 224-229. <https://www.ncbi.nlm.nih.gov/pubmed/18761003>

Oshima N. et al, 2012. The Suicidal Feelings, Self-Injury, and Mobile Phone Use After Lights Out in Adolescents. *Journal of Pediatric Psychology* 37(9) pp. 1023–1030. <https://www.ncbi.nlm.nih.gov/pubmed/22728900>

Otitolaju A. A. et al., 2010. Preliminary study on the induction of sperm head abnormalities in mice, *Mus musculus*, exposed to radiofrequency radiations from Global System for Mobile Communication Base Stations. *Bull. Environ. Contam. Toxicol.* 84(1):51-4. <http://www.ncbi.nlm.nih.gov/pubmed/19816647>

Ozgun E. et al, 2013. Effects of prenatal and postnatal exposure to GSM-like radiofrequency on blood chemistry and oxidative stress in infant rabbits, an experimental study. *Cell Biochem biophys* 67(2):743-751. <http://www.ncbi.nlm.nih.gov/pubmed/23526187>

Panagopoulos D. J. et al., 2010. Bioeffects of mobile telephony radiation in relation to its intensity or distance from the antenna. *Int. J. Radiat. Biol.* Vol 86(5):345-357. <http://www.ncbi.nlm.nih.gov/pubmed/20397839>

Persson B. R. R. et al., 1997. Blood-brain barrier permeability in rats exposed to electromagnetic fields used in wireless communication. *Wireless Networks* 3: 455-461.

Phillips JL et al, 2009. Electromagnetic fields and DNA damage. *Pathophysiology* 16(2-3): 79-88.
<https://www.ncbi.nlm.nih.gov/pubmed/19264461>

Pyrpasopoulou A. et al., 2004. Bone morphogenic protein expression in newborn kidneys after prenatal exposure to radiofrequency radiation. *Bioelectromagnetics* 25:216-27.
<http://www.ncbi.nlm.nih.gov/pubmed/15042631>

Qin F. et al, 2012. Effects of 1800-MHz radiofrequency fields on circadian rhythm of plasma melatonin and testosterone in male rats. *J. toxicol Environ Health A* 75(18): 1120-1128.
<http://www.ncbi.nlm.nih.gov/pubmed/22891885>

Qin F. et al, 2014. Circadian alterations of reproductive functional markers in male rats exposed to 1800 MHz radiofrequency field. *Chronobiol Int* 31(1): 123-133.
<http://www.ncbi.nlm.nih.gov/pubmed/24117058>

Redmayne M. et al, 2011. Adolescent in-school cell phone habits: A census of rules, survey of their effectiveness, and fertility implications. *Reprod Toxicol* 32(3): 354-359.
<https://www.ncbi.nlm.nih.gov/pubmed/21920431>

Rezk A.Y. et al, 2008. Fetal and neonatal responses following maternal exposure to mobile phones. *Saudi Med J* 29(2): 218–23. <https://www.ncbi.nlm.nih.gov/pubmed/18246230>

Ruediger H.W., 2009. Genotoxic effects of radiofrequency electromagnetic fields. *Pathophysiology* 16(2–3): 89–102. <https://www.ncbi.nlm.nih.gov/pubmed/19285841>

Sadetzki S. et al, 2008. Cellular Phone Use and Risk of Benign and Malignant Parotid Gland Tumors—A Nationwide Case-Control Study. *Am J Epidemiol* 167(4): 457–467.
<https://www.ncbi.nlm.nih.gov/pubmed/18063591>

Salford L. G., et al., 2003. Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones. *Environ. Health Perspect.* 111: 881-883.
<http://www.ncbi.nlm.nih.gov/pubmed/12782486>

Salford L. G. et al., 2010. Effects of microwave radiation upon the mammalian blood-brain barrier. *European Journal of Oncology Library* Vol. 5: 333-355.
[http://www.icems.eu/papers.htm?f=/c/a/2009/12/15/MNHJ1B49KH.DTL part 2.](http://www.icems.eu/papers.htm?f=/c/a/2009/12/15/MNHJ1B49KH.DTL_part_2)

Schwarz C. et al, 2008. Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes. *Int Arch Occup Environ Health* 81(6): 755-767. <https://www.ncbi.nlm.nih.gov/pubmed/18278508>

Sekeroglu A.Z. et al, 2013. Evaluation of the cytogenotoxic damage in immature and mature rats exposed to 900 MHz radiofrequency electromagnetic fields. *Int J Radiat Biol* 89(11): 985-992.
<https://www.ncbi.nlm.nih.gov/pubmed/23718180>

Shahbazi-Gahrouei D. et al, 2012. Mobile phone radiation interferes laboratory immunoenzymometric assays: Example chorionic gonadotropin assays. *Pathophysiology* 19: 43–47.
<https://www.ncbi.nlm.nih.gov/pubmed/22325369>

Sonmez O.F. et al, 2010. Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field. Brain Research 1356: 95-101.
<https://www.ncbi.nlm.nih.gov/pubmed/20691167>

Sudan M. et al, 2012. Prenatal and Postnatal Cell Phone Exposures and Headaches in Children. The Open Pediatric Medicine Journal 6: 46-52. <https://www.ncbi.nlm.nih.gov/pubmed/23750182>

Vecchio F. et al, 2007. Mobile phone emission modulates interhemispheric functional coupling of EEG alpha rhythms. Eur J Neurosci 25(6): 1908-1913.
<http://www.ncbi.nlm.nih.gov/pubmed/17432975>

Volkow N.D. 2011. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. JAMA 305(8): 808-813. <http://www.ncbi.nlm.nih.gov/pubmed/21343580>

Yakymenko I. et al, 2011. Long-term exposure to microwave radiation provokes cancer growth: evidences from radars and mobile communication systems. Exp Oncol 33(2): 62–70.
<https://www.ncbi.nlm.nih.gov/pubmed/21716201>