

General Statements

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Cell Phone Radiation-Brain

- 1. Time trend in incidence of malignant neoplasms of the central nervous system in relation to mobile phone use among young people in Japan.** This Japanese study showed that malignant neoplasms of the central nervous system had increased between 1993 to 2010 in young people but failed to establish whether this was due to heavy cell phone use.
- 2. Tumour promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans.** This was the second study carried out looking at the effects of cell phone radiation. The original study suggested that cell phone radiation possibly caused tumours in the lungs and livers. The second study using a larger control group definitely showed a link and what's more the exposure levels were at the low to moderate exposure levels of SAR.
- 3. Long-term mobile phone use and acoustic neuroma risk. The findings do not support the hypothesis that long-term mobile phone use increases the risk of acoustic neuroma.** The study suggests that phone use might increase the likelihood that an acoustic neuroma case is detected and that there could be bias in the laterality analyses performed in previous studies.
- 4. Using the Hill viewpoints from 1965 for evaluating strengths of evidence of the risk for brain tumours associated with use of mobile and cordless phones.** Based on the Hill criteria, glioma and acoustic neuroma should be considered to be caused by RF-EMF emissions from wireless phones and regarded as carcinogenic to humans, classifying it as group 1 according to the IARC classification. Current guidelines for exposure need to be urgently revised.
- 5. Association between vestibular schwannomas and mobile phone use.** This study was carried out on patients who had developed vestibular schwannomas (VSs). Vestibular schwannomas grow in the area where energy from the phone is absorbed in the body. The 119 patients had undergone surgical tumour removal and were questioned on their cell phone use, suggested results showed a direct link between cell phone usage and tumour growth.
- 6. Vestibular schwannoma and cell-phones. Results, limits and perspectives of clinical studies.** This was a review of a number of clinical studies in which the reviewers concluded that there were many flaws in the published studies notably how long the studies ran and also the fact that all studies involved going back in time and offering a retrospective study.
- 7. The IARC carcinogenicity evaluation of radio-frequency electromagnetic field: with special reference to epidemiology of mobile phone use and brain tumour risk.** The International Agency for Research on Cancer of World Health Organization announced in May 2011 the results of evaluation of carcinogenicity of radio-frequency electromagnetic field. In the overall evaluation, the radio-frequency electromagnetic field was classified as "possibly carcinogenic to humans", on the basis of the fact that the evidence provided by epidemiological studies and animal bioassays was limited.

Regarding epidemiology, the results of the Interphone Study, an international collaborative case-control study, were of special importance, together with the results of a prospective cohort study in Denmark, case-control studies in several countries, and a case-case study in Japan. The evidence obtained was considered limited, because the increased risk observed in some studies, was possibly spurious, caused by selection bias or recall bias as well as residual effects of confounding factors. Further research studies, such as large-scale multinational epidemiological studies, are crucially needed to establish a sound evidence base from which a more conclusive judgment can be made for the carcinogenicity of the radio-frequency electromagnetic field.

- 8. Mobile phone use and risk of brain neoplasms and other cancers: prospective study.** This very large survey of 791,710 women in the UK, looked at cell phone use in 1999, 2005 and 2009. Whilst risk remained at acceptable levels for other cancers, acoustic neuroma (benign tumour) showed increased levels, particularly over time.
- 9. Risk of major lymphoma subtypes and use of mobile phones.** This Italian study involving 322 individuals looked at two types of cancer, lymphoma, and chronic lymphocytic leukaemia. The study was published but the results were contradictory.
- 10. Changes in brain glioma incidence and laterality correlates with use of mobile phones--a nationwide population based study in Israel.** This study looked at individuals in Israel between 1980 to 2009 who had developed gliomas. Again results were contradictory with incidence of cancer in men dropping and in women rising. A shift to left sided tumour development was noted particularly in the age range of 20-49.
- 11. Cellular telephones and non-Hodgkin lymphoma.** This study backed up previous work in non-Hodgkin lymphoma (NHL) and its relationship to cell phone radiation in showing no association. However, the timeline for both was 6 years or 200 hrs cumulative use, a short period in both timelines.

Cell Phone Radiation- Radiation

- 12. Modelling and assessment of the electric field strength caused by mobile phone to the human head.** The more powerful the phone the more damage it can do, high electric field strength is created by cell phones and is distributed over the ear nearest to the cell phone.
- 13. Large scale study on the variation of RF energy absorption in the head & brain regions of adults and children and evaluation of the SAM phantom conservativeness.** A study evaluating phantom heads for both adult and children. There was no difference in SAR induced in the adult or child heads.
- 14. The use of cell phone and insight into its potential human health impacts.** This review concluded that a large number of studies had shown

there was no direct link between cell phone usage and cancer. However, the evidence for cancer developed after exposure to cell phone is conflicting. More research needed. This is also a paper commentating on the direct link between cell phones and type 2 diabetes.

- 15. Response to Comments on Meo et al. Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations with Glycated Haemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus.** *Int. J. Environ. Res. Public Health*, 2015, 12, 14519-14528. Responses from researchers on the link between cell phones and type 2 diabetes.
- 16. Comments on Meo et al. Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations with Glycated Haemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus.** *Int. J. Environ. Res. Public Health*, 2015, 12, 14519-14528. Further comments on the link between diabetes and cell phones
- 17. Effects of mobile phone exposure (GSM 900 and WCDMA/UMTS) on polysomnography based sleep quality: An intra- and inter-individual perspective.** 30 human male volunteers were exposed to cell phone radiation whilst asleep. Results showed both negative and positive reactions in sleep patterns. More research needed to confirm causal link.
- 18. Tinnitus and cell phones: the role of electromagnetic radiofrequency radiation.** This showed a link between the onset of tinnitus and the high use of cell phones.
- 19. Radiation Monitoring for the Masses.** Review of radiation devices for humans.
- 20. Effect of cell phone-like electromagnetic radiation on primary human thyroid cells.** With this study no connection was seen with cell phone radiation on thyroid cells. However additional studies are recommended.
- 21. Memory performance, wireless communication and exposure to radiofrequency electromagnetic fields:** A prospective cohort study in adolescents. This study showed that memory loss occurred over a period of one year linked to cell phone usage and cell phone microwave strength.
- 22. Analysis on the effect of the distances and inclination angles between human head and mobile phone on SAR.** A simple trial which concluded that the greater the distance from the head, the cell phone is, the smaller the SAR effect.
- 23. Exposure to non-ionizing electromagnetic radiation from mobile telephony and the association with psychiatric symptoms.** A direct link was shown between heavy exposure to cell phone radiation and psychiatric symptoms.
- 24. Effects of concurrent caffeine and mobile phone exposure on local target probability processing in the human brain.** No link shown between the consumption of caffeine from fluids and cell phone usage.

- 25. Scientists decry Canada's outdated Wi-Fi safety rules.** Scientists protest at Canada's outdated regulations regarding Wi-Fi.
- 26. Effect of mobile phone use on metal ion release from fixed orthodontic appliances.** Metal crowns used in some dentures conduct EMF but this seems to have no negative effects.
- 27. Development of an RF-EMF Exposure Surrogate for Epidemiologic Research.** A research study looking at the development of a surrogate computer model. Further work required as unsure of near field and far field interference.
- 28. Does the Brain Detect 3G Mobile Phone Radiation Peaks? An Explorative In-Depth Analysis of an Experimental Study.** Yes, the brain can detect mini peaks in cell phone radiation, how it is affected, requires further work.
- 29. Analysis of Electric Stress in Human Head in High-frequency Low-power Electromagnetic Environment.** This work confirmed that the cell phone radiation caused the greatest stress level between the phone and the skull, within the ear area.
- 30. Effects of extremely low frequency electromagnetic field (ELF-EMF) on catalase, cytochrome P450 and nitric oxide synthase in erythro-leukemic cells.** This study demonstrated that minute changes were taking part in blood marrow cells. These indications had been shown in leukaemia cells. Further work must be done to show the effect on long term exposure on these cells.
- 31. Real versus Simulated Mobile Phone Exposures in Experimental Studies.** Studies using simulated cell phone data in experimental studies are not fit for purpose. Real time cell phone data is urgently required showing that cell phone radiation varies tremendously particularly cell phone models.
- 32. The influence of electromagnetic radiation generated by a mobile phone on the skeletal system of rats.** Cell phone radiation affects bone structure and bone density.
- 33. Epidemiology of gliomas.** Cell phone radiation has been implicated in the increase of brain tumours a risk not proven yet. New risk variants have been discovered, further work needs to be done.
- 34. Effect of Electromagnetic Waves Emitted from Mobile Phone On Brain Stem Auditory Evoked Potential in Adult Males.** Cell phone radiation affects your hearing ability.
- 35. The assessment of electromagnetic field radiation exposure for mobile phone users.** Analysis of the risks of using being exposed to cell phone radiation in different situations. The best advice is keep your cell phone away from head and body and when rural areas where the cell phone signal is weak, your cell phone will be generating maximum radiation
- 36. Mobile phone use and brain tumours in the CERENAT case-control study.** Further support showing the carcinogenic effect of cell phone radiation in humans, remains controversial. However, it has been suggested that the radiation could be involved in the development of some types of brain tumours.

- 37. Exposure to 1800 MHz radiofrequency radiation impairs neurite outgrowth of embryonic neural stem cells.** Cell phone radiation affects embryonic nerve cell development. Further research required.
- 38. Fundamentally new electromagnetic pollution and the lack of adequate regulatory framework--on the risk assessment (analysis of modern domestic and foreign data.** As of 2014 the existing legal framework on the influence of cell phone radiation on human health does not meet current concerns on the effect it has on the human body.
- 39. Hsp70 is an independent stress marker among frequent users of mobile phones.** Heat shock protein a reliable marker in the blood is produced when the body is exposed to cell phone radiation.
- 40. Specific absorption rate variation in a brain phantom due to exposure by a 3G mobile phone: problems in dosimetry.**
- 41. Cancer risks related to low-level RF/MW exposures, including cell phones.** Although long running studies have not shown a large increase in brain cancer, small sub groups within this study have shown increases.
- 42. Wi-Fi technology--an uncontrolled global experiment on the health of mankind.** This paper discusses the potential health hazard and lack of scientific assessment and regulatory actions in protection of the life on the planet.
- 43. Effect of Radiofrequency Radiation on Human Hematopoietic Stem Cells:** Radiofrequency electromagnetic fields did not affect cells of the hematopoietic system, in particular HSC, under the given experimental conditions.
- 44. Modelling and assessment of the electric field strength caused by mobile phone to the human head.** Increased cell phone strength i.e. 2G,3G and to 5G leads to greater SAR and greater field spread over the head.
- 45. Effects of the Effect of Ultra High Frequency Mobile Phone Radiation on Human Health.** This study showed that people using a cell phone for more than 50 minutes are at greater risk of early dementia due to the burning up of glucose in the brain.
- 46. Microwave radiation (2.45 GHz)-induced oxidative stress:** Whole body exposure effect on histopathology of Wistar rats. Another study showing that cell phone radiation caused a number chemical markers in the cell to increase, including oxidative stress i.e. free radicals.
- 47. Effect of radiofrequency radiation in cultured mammalian cells:** A review of a number of published clinical papers dealing the effect of cell phone radiation on various chemical markers in the body. Some papers show positive results; some papers show contradictory results. The reviewers show some contradictory advice.
- 48. Effects of GSM-like radiofrequency irradiation during the oogenesis and spermiogenesis of *Xenopus laevis*.** This study which used the African

horned toad as a study animal concluded that cell phone radiation can have severe effects on both male and female reproduction.

- 49. The Effects of Electromagnetic Field on the Endocrine System in Children and Adolescents.** Although the results are conflicting and cannot be totally matched with humans; there is growing evidence to distress us about the threats of cell phone radiation on children.
- 50. Mobile Phone Radiation: Physiological & Pathophysiological Considerations.** A review of all the published evidence to date, this concluded that there are too many variables in the studies i.e. too many inaccurate measurement, positioning of cell phones to name only but a few. One of the recommendations was that reviewers should carry their own micro waves dosimeters for ensuring the correct dose measurements when conducting experiments.
- 51. Activity and expression of acetylcholinesterase in PC12 cells exposed to intermittent 1.8 GHz 217-GSM mobile phone signal.** This study confirmed that ability of cell phone radiation to produce biological changes in human cell.
- 52. Metamaterial-Embedded Low SAR PIFA for Cellular Phone.** This showed that material imbedded in the cell phone cut down on SAR.
- 53. Assessment of contribution of other users to own total whole-body RF absorption in train environment.** This study showed that up to 19% cell phone radiation affecting you can come from other users, in this case on the train.
- 54. Exposure to 915 MHz radiation induces micronuclei in Vicia faba root tips.** Even plants are not immune to cell phone radiation. Cell phone radiation causes mutagenic growths in plants exposed to radiation.
- 55. Exposure to 3G mobile phone signals does not affect the biological features of brain tumour cells.** Human glioblastoma cell lines were exposed to cell phone radiation and no changes were shown in the cells, but the time exposed was only 48 hours.
- 56. Sensitivity of spiral ganglion neurons to damage caused by mobile phone electromagnetic radiation will increase in lipopolysaccharide-induced inflammation in vitro model.** This study showed that ganglion neurons will be damaged by cell phone radiation.
- 57. A genotoxic analysis of the hematopoietic system after mobile phone type radiation exposure in rats.** This study showed no damage to bone marrow cells at increased levels of different wave length.
- 58. Analysis on the effect of the distances and inclination angles between human head and mobile phone on SAR.** Holding the phone further away from head will decrease SAR but changing the angle of the phone does not change the SAR level in all cases.
- 59. Biomarkers in volunteers exposed to mobile phone radiation.** No changes shown in biomarkers in the blood, however all the tested volunteers were heavy cell phone users for a number of years.

- 60. Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation.** This study showed that cell phone radiation may cause hazardous effects to the brain.
- 61. Tumour promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans.** This study helps to confirm the increased incidences of brain tumours in heavy users of cell phones.
- 62. The discrepancy between maximum in vitro exposure levels and realistic conservative exposure levels of mobile phones operating at 900/1800 MHz** Research in laboratory now recommends that when complying experimental figures, the maximum SAR exposures are used together with additional temperature control thereby showing a more realistic protocol.
- 63. Exposure to 900 MHz electromagnetic fields activates the mmp-1/ERK pathway and causes blood-brain barrier damage and cognitive impairment in rats.** Exposure to cell phone radiation leads to memory loss and damage to the blood brain barrier.
- 64. Bio electromagnetic effects measurements - SAR and induced current.** This review looked at both practical papers and theoretical papers and concluded that induced current was as important as SAR in damaging the body.
- 65. The effect of 900 and 1800 MHz GSM-like radiofrequency irradiation and nicotine sulphate administration on the embryonic development of *Xenopus laevis*.** In this experiment it showed if you smoked and used a cell phone together they would have a worse effect on your health than if you used each one separately.
- 66. Long term and excessive use of 900 MHz radiofrequency radiation alter microRNA expression in brain.** A long term test of 12 months showed that cell phone radiation damaged the microRNA.
- 67. A method for safety testing of radiofrequency/microwave-emitting devices using MRI.** The use of magnetic resonance imaging can show additional affected areas such as temperature mapping and thermal properties of cell phone radiated cells.
- 68. Impact of head morphology on local brain specific absorption rate from exposure to mobile phone radiation.** More work required on skull shape as this has an effect on the individual's SAR number.
- 69. Mobile telephones: a comparison of radiated power between 3G VoIP calls and 3G VoCS calls.** Measurements were made in Paris over both internet protocol (IP) and voice of circuit switch (CS) 220 two minute calls were made. Cell phone radiation exceeded the current exposure limits of SAR.
- 70. Analysis of the influence of handset phone position on RF exposure of brain tissue.** SAR figures are directly influenced by the position of a cell phone to the side of the head.
- 71. Effects of early-onset radiofrequency electromagnetic field exposure (GSM 900 MHz) on behaviour and memory in rats.** Memory was not affected

over a short period but further tests are required over a longer period up to 12 months

- 72. The effects of N-acetylcysteine and epigallocatechin-3-gallate on liver tissue protein oxidation and antioxidant enzyme levels after the exposure to radiofrequency radiation.** Exposure to cell phone radiation was moderated by treatments of potent anti-oxidants which help to protect the body from the damage caused this radiation.
- 73. Multigenerational effects of whole body exposure to 2.14 GHz W-CDMA cellular phone signals on brain function in rats.**
- 74. Effect of a 2.45-GHz radiofrequency electromagnetic field on neutrophil chemotaxis and phagocytosis in differentiated human HL-60 cells.** Research showed that cell phone radiation affects the immune system but further work is needed.
- 75. Selenium reduces mobile phone (900 MHz)-induced oxidative stress, mitochondrial function, and apoptosis in breast cancer cells.** Selenium selenite a potent anti-oxidant helps to suppress cell phone radiation damage to cells in the body especially breast cancer cells
- 76. Exposure to 1800 MHz radiofrequency radiation impairs neurite outgrowth of embryonic neural stem cells.** More clinical work required on cell phone radiation damage to brain cell development.
- 77. Alteration of glycine receptor immunoreactivity in the auditory brainstem of mice following three months of exposure to radiofrequency radiation at SAR 4.0 W/kg.** As previously noted more clinical work required on cell phone radiation damage to brain cell development and over a longer term.
- 78. The protective effect of autophagy on mouse spermatocyte derived cells exposure to 1800MHz radiofrequency electromagnetic radiation.** Autophagy is the body's cell responding to adverse conditions produced by cell phone radiation, by breaking down damaging chemical compounds. Call it self-cleaning.
- 79. Effects of 900 MHz radiofrequency radiation on skin Hydroxyproline contents.** This study showed that cell phone radiation could alter Hydroxyproline levels in the skin, this one of the four building blocks of collagen (call it the skins scaffolding).
- 80. Specific absorption rate variation in a brain phantom due to exposure by a 3G mobile phone: problems in dosimetry.** Yet another trial trying to relate a phantom brain in a Perspex box to real time urban and rural cell phone radiation exposure
- 81. Prediction and comparison of downlink electric-field and uplink localised SAR values for realistic indoor wireless planning.** This study produced a more accurate model for assessing SAR.
- 82. Modelling of EEG electrode artefacts and thermal ripples in human radiofrequency exposure studies.** No relationship was established between

cell phone radiation, wake or sleep mode in subjects, as measured by using EEG.

- 83. Effects of the exposure to intermittent 1.8 GHz radio frequency electromagnetic fields on HSP70 expression and MAPK signalling pathways in PC12 cells.** This study showed that a chemical marker called Heat Shock protein appeared after exposure to cell phone radiation.
- 84. Evaluation of selected biochemical parameters in the saliva of young males using mobile phones.** Results suggest that exposure to cell phone or radiation may cause stress in human cells as evidenced by the increase in the concentration of SOD released into the saliva of cell phone users.
- 85. Histological and cytological examination of rat reproductive tissue after short-time intermittent radiofrequency exposure.** Short term exposure does not damage fertility rates in rats.
- 86. Electromagnetic fields (UHF) increase voltage sensitivity of membrane ion channels; possible indication of cell phone effect on living cells.** Work on cells showed that the wavelength of 930 MHz had the greatest effect on the cells general sensitivity to external stimuli.
- 87. No influence of acute RF exposure (GSM-900, GSM-1800, and UMTS) on mouse retinal ganglion cell responses under constant temperature conditions.** No changes were observed on the retinal cells of rats after being exposed to different levels of cell phone radiation.
- 88. In-vitro exposure of neuronal networks to the GSM-1800 signal.** Neural cells responded to cell phone radiation.
- 89. Effect of a single 30 min UMTS mobile phone-like exposure on the thermal pain threshold of young healthy volunteers.** Human volunteers were subjected to increased heat levels on the tips of their fingers, whilst at the same time receiving a cell phone signal through an antenna on their heads. The active group as opposed to the sham group gradually became more sensitive to the heat application.
- 90. Long-term effects of 900 MHz radiofrequency radiation emitted from mobile phone on testicular tissue and epididymal semen quality.** Fertility parameters were changed in this animal study over one year. More studies required.
- 91. Analysis of mobile phone design features affecting radiofrequency power absorbed in a human head phantom.** This study showed that the shape of the phone, the position of the antenna etc. impacted on the SAR figures.
- 92. Compliance boundaries for multiple-frequency base station antennas in three directions.** When assessing compliance protocols, figures generated may be out by 122%.
- 93. Exposure to 1800 MHz radiofrequency electromagnetic radiation induces oxidative DNA base damage in a mouse spermatocyte-derived cell line.** Damage to mouse fertility does occur when exposed to cell phone radiation.

Higher levels of free radicals are produced but these levels can be reduced by taking Vitamin E.

- 94. Effect of SAR on human head modelling inside cylindrical enclosures.** If you use a cell phone in an area which is similar to a round metal cylinder, then the SAR value is increased.
- 95. Influence of GSM signals on human peripheral lymphocytes: study of genotoxicity.** This was an interesting study in that they used blood from two human control groups. This blood was tested for a number of cellular parameters however no changes that were significant were observed. The study was conducted for 28 hours only; longer term tests are required.
- 96. Assessment of the portable radiophone users' exposure to electromagnetic fields, with use of numerical simulations and directive 2013/35/EU requirements.** This Polish study showed that SAR levels are exceeded by workers despite both Polish and EU directives in force.
- 97. Effects of simultaneous combined exposure to CDMA and WCDMA electromagnetic fields on serum hormone levels in rats.** Levels of endocrine hormones in rats were not affected by exposure to cell phone radiation over an 8-week period. Trials need to run for much longer.
- 98. The toxic effects of mobile phone radiofrequency (940 MHz) on the structure of calf thymus** Dante results of this study showed that cell phone radiation at 940 MHz does alter DNA.

Cell Phone and SARS

- 99. Effect of high SARs produced by cell phone like radiofrequency fields on mollusk single neuron.** This study showed that exposure to cell phone radiation stopped the neuron from storing information.
- 100. Electromagnetic and Thermal Simulations of Human Neurons for SAR Applications.** This study could not under experimental conditions observe the heating up of human cells. These conditions were based on theoretical computer models
- 101. Exposure to acute electromagnetic radiation of mobile phone exposure range alters transiently skin homeostasis of a model of pigmented reconstructed epidermis.** This study showed that cell phone radiation altered the ability of human skin to react to external factors.

- 102. SAR measurement due to mobile phone exposure in a simulated biological media.** This study conducted on simulated tissue via a virtual phantom again showed that SAR values were being met. **Analysis of three-dimensional SAR distributions emitted by mobile phones in an**

epidemiological perspective. 3D modelling of SAR in 120 cell phones did show any links to the characteristics of the phone i.e. bar phone, flip with top and flip with central antennas.

- 103. Analysis of the effect of mobile phone base station antenna loading on localized SAR and its consequences for measurements.** This study proposes that the theoretical models used should be changed to take into account new developments in cell phone developments
- 104. Influence of dentures on SAR in the visible Chinese human head voxel phantom exposed to a mobile phone at 900 and 1800 MHz** Dentures can affect the SAR values by as much as 121%. Especially metallic crowns. However, they are generally in line with current safety levels.
- 105. Specific absorption rate evaluation for passengers using wireless communication devices inside vehicles with different handedness, passenger counts, and seating locations.** When using a cell phone in a vehicle, SAR values increase by 5% and will generally be higher than free space.
- 106. Volume-averaged SAR in adult and child head models when using mobile phones: a computational study with detailed CAD-based models of commercial mobile phones.** A study performed using virtual phantoms heads and MRI, found no difference between and adults head or a child head.

Cell Phone Radiation- General Conditions

- 107. Effects of simultaneous combined exposure to CDMA and WCDMA electromagnetic field on immune functions in rats.** Cell phone radiation was shown not to have any effect on the immune system of rats, but this study was for only 8 weeks. Long term studies required.
- 108. Oxidative stress induced by 1.8 GHz radio frequency electromagnetic radiation and effects of garlic extract in rats.** Garlic extract can protect the brain from cell phone radiation. It reduces the level of advanced oxidation protein product in brain tissue.
- 109. Reactive oxygen species formation and apoptosis in human peripheral blood mononuclear cell induced by 900 MHz mobile phone radiation.** Cell phone radiation causes disturbance to lipids, protein and DNA. When cells are exposed up to radiation, 37% are killed in 8 hours.
- 110. Effects of 900 MHz radiofrequency on corticosterone, emotional memory and neuroinflammation in middle-aged rats.** Effects were observed in middle aged rats, however further work is required to reproduce these results and to evaluate what they mean.
- 111. Changes in tympanic temperature during the exposure to electromagnetic fields emitted by mobile phone.** Changes in ear temperature in human volunteers was observed when exposed to cell phone radiation. The results differed between continuous or intermittent exposure.

112. **Effect of electromagnetic radiofrequency radiation on the rats' brain, liver and kidney cells measured by comet assay.** Repeated exposure to cell phone generates 915 MHz irradiation could be a cause of DNA breaks in renal and liver cells.
113. **Mobile phone radiation interferes laboratory immunoenzymometric assays:** For example, chorionic gonadotropin assays were changed when they were exposed to cell phone radiation.
114. **Brain proteome response following whole body exposure of mice to mobile phone or wireless DECT base radiation.** This changed a number of cellular responses in the body producing side effects such as headaches, sleep disturbance, fatigue, memory deficits, and brain tumours.
115. **Effects of RF fields emitted from smart phones on cardio-respiratory parameters: a preliminary provocation study.** After only 30 minutes on human volunteers, half who said that they thought they has developed sensitivity to cell phones, no results seen. Again study so short not even worth running.
116. **Calcium-binding proteins and GFAP immunoreactivity alterations in murine hippocampus after 1 month of exposure to 835 MHz radiofrequency at SAR values of 1.6 and 4.0 W/kg.** Major changes seen at cellular level after one month, which may contribute to the early demise of certain cells.
117. **900-MHz microwave radiation promotes oxidation in rat brain.** Exposure to cell phone radiation increases the level of free radicals which in turn reduces the effectiveness of enzymatic reactions.
118. **A 1.8-GHz radiofrequency radiation induces EGF receptor clustering and phosphorylation in cultured human amniotic (FL) cells.** Cell phone radiation interferes with cell membranes making them less effective
119. **Acute effect of exposure of mollusk single neuron to 900-MHz mobile phone radiation.** Minute changes to cell phone radiation were observed in this experiment.
120. **Head exposure system for a human provocation study to assess the possible influence of UMTS-like electromagnetic fields on cerebral blood circulation using near-infrared imaging.** A study demonstrating a more accurate of assessing SAR on human volunteers.
121. **Variations in amino acid neurotransmitters in some brain areas of adult and young male albino rats due to exposure to mobile phone radiation.** The changes in amino acid concentrations in the brain may help to understand the many reported adverse effects of using mobile phones.
122. **The genotoxic effect of radiofrequency waves on mouse brain.** Cell phones radiation may damage DNA and change gene expression in brain cells.
123. **Human keratinocytes in culture exhibit no response when exposed to short duration, low amplitude, high frequency (900 MHz) electromagnetic fields in a reverberation chamber.** The maximum time human skin cells were exposed was 30 minutes. And the data presented here

show that cultured keratinocytes are not significantly affected by cell phone radiation but there were changes and the time period was too short.

124. **Analysis of gene expression in a human-derived glial cell line exposed to 2.45 GHz continuous radiofrequency electromagnetic fields.** Maximum time exposure was 24 hours, but longer term tests required.
125. **Aneuploidy studies in human cells exposed in vitro to GSM-900 MHz radiofrequency radiation using FISH.** Maximum time exposure was 24 hrs longer term tests required as previously indicated.
126. **Local exposure system for rat's head using a figure-8 loop antenna in 1500-MHz band.** Experimental work on designing a new type of antenna to assess SAR.
127. **Effects on rat testis of 1.95-GHz W-CDMA for IMT-2000 cellular phones.** No changes were seen after rat's reproductive system was exposed for 5 weeks to cell phone radiation. As before exposure time was too short.
128. **Cytogenetic studies in human cells exposed in vitro to GSM-900 MHz radiofrequency radiation using R-banded karyotyping.** A new assessment of cell phone damage to human cells, these new criteria shows changes to the chromosomes. The test time was 24 hours a period which is not long enough.
129. **Short-term memory in mice is affected by mobile phone radiation.** This test showed that exposure of up to 31 days affected the information transfer pathway, leading to short term memory loss.
130. **Effect of exposure to 1,800 MHz electromagnetic fields on heat shock proteins and glial cells in the brain of developing rats.** No changes in the brain of the developing rat were observed.
131. **Pulse modulated 900 MHz radiation induces hypothyroidism and apoptosis in thyroid cells: a light, electron microscopy and immunohistochemical study.** Studies showed that cell phone radiation affects the thyroid gland.
132. **Mobile phone radiation-induced free radical damage in the liver is inhibited by the antioxidants N-acetyl cysteine and epigallocatechin-gallate.** Another study which shows that cell phone radiation causes the release of free radicals which attack cells and enzymatic processes, this can be controlled by taking certain anti-oxidants.

Cell Phone Radiation and Sleep

133. **Cell-Phone Addiction:** This is a review of a number papers which discuss cell phone addiction and how it manifests itself amongst users. It also covers the various ways it affects the body including many sleep disturbance and showing links through to both alcohol and tobacco addiction.
134. **Association Between Portable Screen-Based Media Device Access or Use and Sleep Outcomes: A Systematic Review and Meta-analysis.** This study looked for published data on sleep disturbance patterns and then studied 125,198 children mean age 14.5 years old and 50.1% male. The study

concluded that major sleep disturbance occurred when devices emitting cell phone radiation were introduced into the bedroom. An excellent study giving parents sufficient ammunition to ban those devices during sleeping hours.

135. **Is there any exposure from a mobile phone in stand-by mode?** In standby mode cell phones do not impact on sleep patterns.
136. **Effects of electromagnetic fields emitted from W-CDMA-like mobile phones on sleep in humans.** A further study showing no direct relationship between cell phone radiation and brain waves, this study only exposed the subjects to 3 hours of cell phone radiation.
137. **Sleep Quality in Medical Students; the Impact of Over-Use of Mobile Cell-Phone and Social Networks.** This study again showed sleep disturbance patterns amongst 380 students of which 69% were women, abuse of cell phone use was shown in 11% of the study group. Nearly 62% of the undergraduates reported poor sleep quality.
138. **Association between overuse of mobile phones on quality of sleep and general health among occupational health and safety students.** A similar study as the previous one, again studying sleep disturbance amongst a larger group of 350 students. This study reinforced that sleep disturbance occurs when cell phones are switched on during sleeping hours.
139. **The Impact of Using Cell Phones After Light-Out on Sleep Quality, Headache, Tiredness, and Distractibility Among Students of a University in North of Iran.** This study conducted amongst 358 medical students concluded that 60% of students used their phones at night. There was a significant relationship between using cell phones late at night and insomnia, low energy, tiredness and headache. Once the impact of stressful events was eliminated, the relationship remained significant only for insomnia. In addition, the study showed that medical students were affected when visiting patients and this was an area of concern when diagnosing of diseases were taken into account.
140. **Bedtime mobile phone use and sleep in adults.** The few studies that have investigated the relationship between mobile phone use and sleep have mainly been conducted among children and adolescents. In adults, very little is known about mobile phone usage in bed or after lights out. This cross-sectional study involving 844 Belgium citizens set out to examine the association between bedtime mobile phone use and sleep among adults. Findings suggest that bedtime mobile phone use is negatively related to sleep outcomes in adults, too. It warrants continued scholarly attention as the functionalities of mobile phones evolve rapidly.
141. **Impact of Media Use on Adolescent Sleep Efficiency.** In 2010, American youth aged 8 to 18 spent an average of 7.5 hours daily using entertainment media, an increase of more than an hour compared with

2005. This study of 55 students self-measured their experiences as the other studies have shown cell phones impacted negatively on their sleep patterns.

- 142. Effects of mobile phone exposure (GSM 900 and WCDMA/UMTS) on polysomnography based sleep quality: An intra- and inter-individual perspective.** This double blind study of 30 young men aged 18-30 demonstrated that sleep disturbance patterns do occur particularly in all sleep variable, further work needs to be done.
- 143. Environmental Radiofrequency Electromagnetic Fields Exposure at Home, Mobile and Cordless Phone Use, and Sleep Problems in 7-Year-Old Children.** This study of 2361 Dutch children was extremely thorough in its setting up. When the children were 5 years old a complete and complex mapping was undertaken showing cell phone radio stations together and the use of cordless phones, cell phones and Wi-Fi. When the child was 7 a thorough study using 8 sleep subscales was undertaken. Sleep patterns were disrupted but no direct correlation to cell phones or other RMF devices.
- 144. The impact of Sleep Time-Related Information and Communication Technology (STRICT) on sleep patterns and daytime functioning in American adolescents.** This study of 3139 adolescents 49.3% females, showed direct links with sleep disturbance and concluded that some form of control of cell phones in the bedroom should be introduced.
- 145. Technology Use and Sleep Quality in Preadolescence and Adolescence.** Another study of 850 individuals both preadolescents and adolescents again reinforced that cell phone usage causes sleep disturbance.
- 146. Symptoms and Cognitive Functions in Adolescents in Relation to Mobile Phone Use during Night.** Many adolescents tend to leave their mobile phones turned on during night, accepting that they may be awakened by an incoming text message or call. 439 adolescents completed questionnaires about their mobile phone use during night, health related quality of life and possible confounding factors. Memory and cognitive function were found not to be affected but other aspects such as tiredness, insomnia etc. showed strong negative results.
- 147. Adolescent Problematic Social Networking and School Experiences: The Mediating Effects of Sleep Disruptions and Sleep Quality.** In Australia 1,886 students between the ages of 12 to 18 completed a self-report on social networking use, sleep disturbances, sleep quality, and school satisfaction. The results showed that those who had negative comments on the four areas chosen also had poor sleep patterns.
- 148. Exposure to radiofrequency electromagnetic fields and sleep quality: a prospective cohort study.** This study concluded that cell phone radiation did not impact on sleep patterns.
- 149. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students.** A further report showing that 319 students who were awakened during the night showed an increase in

negative health symptoms such as tiredness, rapid exhaustibility, headache and physical ill-being, but not with memory and concentration capacity.

- 150. Biomarkers in volunteers exposed to mobile phone radiation.** This study showed some changes in blood markers, but unable to demonstrate conclusively as only 24 students used all who were already cell phone users. A badly constructed study.
- 151. Mobile phones: time to rethink and limit usage.** It is well known the microwaves from cell phones contribute to potential health problems was an open study paper asking that the Government of India ensure that correct safety levels are incorporated into law.
- 152. Occupational electromagnetic field exposures associated with sleep quality: a cross-sectional study.** Exposure to electromagnetic field (EMF) emitted by mobile phone and other machineries concerns half the world's population and raises the problem of their impact on human health. The present study aims to explore the effects of electromagnetic field exposures on sleep quality and sleep duration among workers from electric power plant. 854 workers were involved, not only with questionnaires but also had blood taken and were subjected to a physical examination. Those workers who had high exposure to EMF had a higher risk of bad sleep quality.
- Cell Phone and Neural**
- 153. Modelling of EEG electrode artefacts and thermal ripples in human radiofrequency exposure studies.** The relationship between heat and brainwaves still remains unknown.
- 154. In-vitro exposure of neuronal networks to the GSM-1800 signal.** Exposure of neural cells to cell phone radiation showed that certain criteria changed by as much as 30% during the study. Further work needs to be done.

Cell Phone Radiation and Stem Cells

- 155. Effect of Radiofrequency Radiation on Human Hematopoietic Stem Cells.** This study was the first published study in which human stem cells were exposed to cell phone microwaves as generated by cell phones. Study inconclusive as it failed to replicate true cell phone exposure as human stem cell were exposed for only 4 hours.
- 156. Electromagnetic field and brain development.** A balanced study which built on existing data showing damage to neural stem cell in both the brain and CNS (central nervous system). In addition, it showed cell damage to the reproductive system as well.
- 157. New Horizons in Enhancing the Proliferation and Differentiation of Neural Stem Cells Using Stimulatory Effects of the Short Time Exposure to Radiofrequency Radiation.** This study was in itself a study of studies. The

researchers set out to review work that had been done on the beneficial effects of cell phone radiation on stem cell development. Whilst they found examples of cognitive function (thought process and understanding) increased under certain conditions what they also found that damage was caused to stem cells in the body.

- 158. Effect of Mobile Phone-Induced Electromagnetic Field on Brain Hemodynamic and Human Stem Cell Functioning: Possible Mechanistic Link to Cancer Risk and Early Diagnostic Value of Electron Photonic Imaging.** A study which strongly shows that damage occurs not only to stem cells but cerebral(brain) flow was altered. This showed that stem cells were very sensitive to microwave exposure, far more so than cells which had differentiated(changed). In addition, stem cells were sensitive to more frequencies than differentiated cells. A very important study due to its use of many different types of measurements and the results they showed.
- 159. Influence of smartphone Wi-Fi signals on adipose-derived stem cells.** A flawed study as they used stem cells derived from adipose tissue and grew two cultures one at 37°C and the other grown at 39°C for 5 days. After 5 days they measured certain activities of the stem cell and concluded that no major changes in stem cells could be seen and those minor changes could be due to the thermal effects of the cell phone. Too short a trial and ignoring the thermal heat changes attributed to the cell phone.

Cell Phones and Damage to Nerve Cell

- 160. Alteration of glycine receptor immunoreactivity in the auditory brainstem of mice following three months of exposure to radiofrequency radiation at SAR 4.0 W/kg.** An excellent study as it shows damage to nerve cell development over a period of time and higher exposure. Certain proneural genes (starter genes) could not start to grow correctly as the proteins required were damaged.
- 161. Exposure to 1800 MHz radiofrequency radiation impairs neurite outgrowth of embryonic neural stem cells.** This clinical paper showed that certain brain tumours are caused by cell phone radiation. It also demonstrated how this occurs. The body normally produces a tumour suppressing protein TP53, however when exposed to cell phone radiation this protective action stops and disrepair occurs in stem cells. These changes are critical events in the multistage origination of various leukaemia's and tumours, including gliomas.
- 162. Microwaves from Mobile Phones Inhibit 53BP1 Focus Formation in Human Stem Cells More Strongly Than in Differentiated Cells: Possible Mechanistic Link to Cancer Risk.** Our findings, that stem cells are most

sensitive to microwave exposure and react to more frequencies, than do differentiated cells may be important for cancer risk assessment.

163. Problems in assessment of risks from exposures to microwaves of mobile communication. The study concluded that you cannot assess cell phone radiation by using the SAR measurement only, other areas must be measured.

Cell Phone -Children

164. The Effects of Electromagnetic Field on the Endocrine System in Children and Adolescents. It's difficult to perform tests on human embryos and children due to ethical issues. Studies performed on virtual models and animals can assist them but there seems to be growing evidence that cell phone radiation can cause distress in humans.

165. Protect children from EMF.As the decade goes by the world is exposed to greater amount of cell phone radiation and Wi-Fi each year. With children as young as 2 years old using cell phones and phablets we must ensure that they are protected against cell phone radiation over the next 20 to 30 years.

166. Thermal effects of mobile phone RF fields on children: a provocation study. The researches could find no differences in readings in the groups, however they concluded the 15-minute test was not long enough. They also commented that group of 14 to 15-year-old school boys could experience stress if the experiments were any longer.

167. Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. A study which showed that the models of children's heads used in the SAR test greatly under estimate the penetration of cell phone radiation and need to be revised urgently.

168. Mobile phone use and health symptoms in children. A very interesting study that came to the conclusion that children's health markers of a period of one year had worsened over a period of one year. They also concluded that children who use cell phones in the decade will be exposed to cell phone radiation for a much longer period than now.