



## **Results of the public consultation on SCENIHR's preliminary Opinion on Potential health effects of exposure to electromagnetic fields (EMF)**

A public consultation on this Opinion was opened on the website of the Scientific Committees from 4 February to 16 April 2014. A public hearing was also held in Athens, on 27 March 2014.

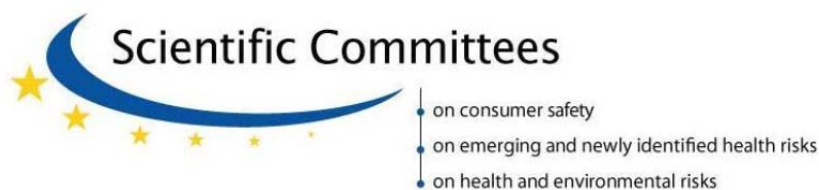
Information about the public consultation and the hearing was broadly communicated to national authorities, international organisations and other stakeholders.

The aim of these open consultations were to present the preliminary Opinion and gathering specific comments, suggestions, explanations or contributions on the scientific basis of the Opinion, as well as any other scientific information regarding the questions addressed.

57 organisations and individuals participated in the public consultation providing 186 comments to different chapters and section of the Opinion. Each submission was carefully considered by the SCENIHR and the scientific Opinion has been revised to take account of relevant comments. The cut-off date for the literature review was extended and relevant publications were added. In addition, the scientific rationale and the Opinion section were clarified and strengthened and a new chapter on interaction mechanisms was added.

The SCENIHR thanks all contributors for their comments and for references sent during the public consultation.


***The table below shows all comments received on different chapters of the Opinion and SCENIHR's response to them. It is also indicated if the comment resulted in a change in the Opinion.***



| <b>SUBMISSIONS</b>  |   |  | <b>SCENIHRs Response</b>  |
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| <b>Name of individual/organisation</b>  | <b>Table of content to which comment refers</b> | <b>Comment</b>   | <b>SCENIHRs Response</b>  |
| 1. BILLERET Dominique, Toy Industries of Europe, dominique.billeret@tietoy.orgBelgium | 1. BACKGROUND                                   | <p>This comment is related to the Executive Summary (page 11 lines 24 to 31) and was entered here since the scrolling does not allow comments to this part of the report. The new Toy Safety Directive 2009/48 (which entered into force in July 2011):</p> <ul style="list-style-type: none"> <li>- Obliges manufacturers, before placing a toy on the market, to carry out an analysis of the chemical, physical, mechanical, electrical, flammability, hygiene and radioactivity hazards that the toy may present, as well as an assessment of the potential exposure to such hazards (article 18).</li> <li>- Excludes electrical transformers for toys from the definition of toy (Annex I).</li> <li>- Includes a whole new chapter with requirements on electrical hazards (Annex II, Chapter IV) which indicates that "Electric toys must be designed and manufactured in such a way that electric, magnetic and electromagnetic fields and other radiations generated by the equipment are limited to the extent necessary for the operation of the toy, and must operate at a safe level in compliance with the generally acknowledged state of the art, taking account of specific Community</li> </ul> | This is an informative comment related to risk management; no changes in the text are required. |

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|  |                      | <p>measures”.</p> <ul style="list-style-type: none"> <li>- Toys e.g. with communication terminals (such as radio controlled cars) are also affected by the R&amp;TTE directive and the Low Voltage directive requirements.</li> <li>- Toys should comply with the harmonised standards addressing the EMF. This is to be more explicitly addressed in electrical toy safety (CENELEC) standard EN 62115 (and by others such as standards EN 62479, 62311, 62233, 62209 or 55014). Some of these requirements do not apply to toys consuming less than 3 amps, and all toy radio control transmitters would consume significantly less.</li> </ul>  |  |
| <p>2. Jamieson Dr Isaac,<br/>Biosustainable Design,<br/>isaac@biosustainabledesign.org, United Kingdom</p> | <p>1. BACKGROUND</p> | <p>Abstract. P5. Lines 33-34. “There were no additional studies published on health effects of static electric fields to contribute to the existing knowledge.” Refer to Jamieson et al. (2010) for a review of research on the health effects of static electric fields including effects on immune system functioning and removal/deposition of airborne contaminants.</p> <p>Ref: Jamieson et al. (2010), Building health: The need for electromagnetic hygiene?, <a href="http://iopscience.iop.org/1755-1315/10/1/012007/pdf/1755-1315_10_1_012007.pdf">http://iopscience.iop.org/1755-1315/10/1/012007/pdf/1755-1315_10_1_012007.pdf</a></p> <p>[Note: file too large to directly upload on the system].</p> | <p>The reference suggested (contains information about indirect health effects arising from the interaction of static electric fields with the living environment and not with the human body.</p> <p>No changes in the text are required.</p> |

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| <p>3. Keevil Stephen, European Society of Radiology, stephen.keevil@kcl.ac.uk, United Kingdom</p> | <p>1. BACKGROUND</p> | <p>We note that this review is based primarily on new work published since 2009. The review appears to have been conducted rigorously, and welcome the acknowledgement of poor methodology and data analysis in many published studies, and also the general lack of replication. The overall message is that there is a lack of consistent evidence of adverse health effects due to EMF exposure. An exception is the apparent correlation between childhood leukaemia and exposure to EMF in the ELF range. This lacks a plausible mechanism that would allow a causal relationship to be established. It is important that it is made clear to readers of this report, and to the general public, that the purported effect occurs over a narrow frequency range within the very wide frequency spectrum (from static field to THz) considered in the report. Specifically, this frequency range is not relevant to MRI. There is a risk that concerns (well-founded or otherwise) about exposure to EMF may otherwise impact on patient acceptance of MRI, with possible harmful clinical consequences.</p> | <p>It is clear in the text that the statistical association of leukaemia with ELF refers to long-term exposure to magnetic fields from power transmission and distribution systems. The results of the epidemiological studies do not apply to MRI.</p> <p>No changes in the text are required.</p> |
| <p>4. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom</p>                                   | <p>1. BACKGROUND</p> | <p>19 The UK has not implemented measures to limit the exposure of the public to EMF but has made strident efforts to increase the EMF load by switching from cabled internet to WIFI in schools, libraries and public places, within street lamp posts, issuing emf devices through NHS to older people, schools. The London Mayor has implemented a plan to WIFI the whole of London.</p>  | <p>The comment is related to risk management; no changes in the text are required.</p>  |

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| <p>5. Mulligan Mulligan,<br/>mull_nz@yahoo.com,<br/>Ireland</p>  | <p>1. BACKGROUND</p> | <p>This is a general comment. It is absolutely imperative that the bias is removed from research. There are far too many research papers that have been funded by industry such as telecommunication and electric companies. This is creating very skewed results that are doing nothing for the integrity of research into the very complicated subjects of electromagnetic radiation and associated fields. The animal and human population of the world needs to be protected from non-ionising radiation not exposed to an ever increasing dose.</p> | <p>This is a general comment. No changes in the text are required.</p> <p>The SCENIHR has always worked against bias in research, promoting transparency and credibility. The inclusion and exclusion criteria applied for scientific papers have been described in the Opinion.</p>  |
| <p>6. Petersen Ronald,<br/>Secretary, IEEE<br/>International Committee<br/>on Electromagnetic Safety<br/>(IEEE ICES),<br/>r.c.petersen@ieee.org,<br/>United States</p> | <p>1. BACKGROUND</p> | <p><br/>IEEE International<br/>Committee on Electro</p>   | <p>This is a general comment.</p> <p>A general compilation of RF accident statistics across Europe might be a useful resource for risk management, but this falls outside the scope of this committee.</p> <p>The SCENIHR agrees that there are no plausible mechanisms of biophysical interaction, yet. Consequently, no changes in the text are required.</p> <p>Page 27, lines 29-30 of the preliminary Opinion: We agree. The text has been changed accordingly.</p> <p>Page 27, lines 36-45 of the preliminary Opinion: we agree. The text has been changed accordingly.</p> <p>Page 27, lines 46-50 of the preliminary Opinion: We agree however no changes are required in the text.</p> |

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|   |                              |   | <p>Page 36, lines 29-31 of the preliminary Opinion: We agree with the comment and the text has been changed accordingly.</p> <p>Page 43, Section 3.3.7 of the preliminary Opinion. The existing text is considered sufficient. No changes in the text are required.</p>   |
| <p>7. Richards Emily,<br/>emmyrichards1937@gmail.com, Ireland</p>   | <p>1. BACKGROUND</p>         | <p>I am wondering how it is that a review which covered EMF RF's allowed several of the working group to have had close links to telecommunication companies? Some of the working group would have been working for such companies during the time that SCENIHR would have been looking at, 2008-2013. Surely this is a conflict of interest whichever side you are looking at it from. How was this allowed to happen? How could they look objectively at studies which were showing a risk from use of a product produced by a company they were/are working for?</p> | <p>This comment is outside the scope of the public consultation (i.e. scientific evidence to improve the opinion).</p> <p>Rules about conflict of interest of members of the Committees and experts in the working groups are described in the rules of procedures of the Scientific Committees which are available on the website.</p> |
| <p>8. Prof. Dr. Enders Achim,<br/>Institute for EMC /<br/>Technical University<br/>Braunschweig,<br/>achim.enders@tu-bs.de,<br/>Germany</p> | <p>2. TERMS OF REFERENCE</p> | <p>I just have a short comment on a formulation, which in my view is misleading but seems to be formulated already in the request to the committee:<br/>In line 30 on page 16 there is the formulation "the potential role of co-exposures with other environmental stressors in biological effects attributed to EMF". This formulation is given in several headlines of the whole text, e.g. on page 15 line 5 "Health effects from co-exposure of EMF</p>  | <p>The text of the Background and Terms of reference sections is provided by the Commission as part of the mandate and cannot be changed.</p> <p>However, the SCENIHR agrees with the comment and the use of the word "stressor" has been critically reviewed in the Opinion</p>  |

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|   |                              | <p>and other stressors", headlines of chapters 3.11, 3.11.3. and multiple places in the text. With this kind of formulation, the exposure to "EMF" is definitely categorized as a "stressor" to a biological system. However, in the whole report it is concluded that there is no scientific evidence for that, see e.g. on page 5 lines 40 to 45. So the use of such an implicit link between EMF and stress is misleading and I would suggest to remove these links in the whole report. By the way even the use of the word "stressor" should be accompanied by a definition what is meant. "Stressor" may be used in a sloppy scientific smalltalk but in a serious scientific report for the EU notions must either be precisely defined or omitted.</p> |   |
| <p>9. Harkin Marian, European Parliament,<br/>marianharkin@gmail.com,<br/>Ireland</p> | <p>2. TERMS OF REFERENCE</p> | <p>Terms of Reference<br/>Each SCENIHR Report should incorporate all the relevant data from previous reports in the new reports overall analysis. This is a continuum of scientific evidence and this must be analysed to give a true picture. Given that not all studies are included, a list of studies that were assessed and rejected as irrelevant or inadequate should be available. There is a need to ensure the same rigorous assessment of studies with negative outcomes as with positive outcomes. From reading this Opinion this is not evident - certainly not in the commentary Rigorous assessment is necessary to ensure good scientific assessment. I ask the SCENIHR Committee to include the following studies:</p>                        | <p>The text of the Background and Terms of reference sections is provided by the Commission as part of the mandate and cannot be changed.</p> <p>The results from previous reports are summarised in each section under "what was already known on this subject" and mentioned in the corresponding section "conclusions".</p> <p>The literature cut-off date has been extended and the additional literature has been considered.</p> <p>This meta-analysis includes only data</p> |


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|  |                              | <p>1. Occupational and residential exposure to electromagnetic fields and risk of brain tumors in adults: a case-control study in Gironde, France<br/> Isabelle Baldi, Gaelle Coureau, Anne Jaffre, Anne Gruber, Stephane Ducamp, Dorothee Provost, Pierre Lebailly, Anne Vital, Hugues Loiseau and Roger Salamon International Journal of Cancer: 129, 1477-1484 (2011)</p> <p>2. Magnetic field exposure and childhood leukaemia risk. A meta-analysis based on 11, 699 cases and 13,194 controls<br/> Longyu Zhao, Xiaodong Liu, Chunpeng Wang, Kangkang Yan, Xuejun Lin, Shuang Li, Honghong Bao, Xin Liu Leukemia Research (2013) In Press</p>   | <p>from the original studies presented in this or previous Opinion statements. The paper was considered in the final Opinion.</p>  |
| <p>10. Henshaw, Prof Denis Lee,<br/> University of Bristol,<br/> d.l.henshaw@bris.ac.uk,<br/> United Kingdom</p> | <p>2. TERMS OF REFERENCE</p> | <p>All living systems are magnetic field, MF-sensitive, so it is no surprise that this includes adverse health effects in man. Despite the wording, the following areas of Bioelectromagnetics appear to be outside the Terms of Reference, yet are the areas of significant advances in scientific understanding:</p> <p>(i) Health effects of solar-geomagnetic activity/storms, SGMA below 100nT - A well established literature indicates acute effects, such as increase in depressive illnesses, melatonin disruption, heart rate variability and blood pressure changes. (ii) Magnetoreception in microorganism, fungi and plants - A well established research literature with many excellent reviews. (iii) MF effects on pain threshold - wide ranging across animal species, with some</p> | <p>The text of the Background and Terms of reference sections is provided by the Commission as part of the mandate and cannot be changed.</p> <p>However, a section on mechanisms was added to the final Opinion.</p> <p>(i) Members of the scientific committee are appointed following an open call for expression of interest. The selection of committee's members follows strict rules and it is based on the expertise required. Gender and geographical balance are also taken into consideration in the selection process.</p> |



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|  |  | <p>reporting effects below one microtesla.</p> <p>(iv) Animal magnetoreception and navigation - Many animal species, especially birds have been shown to detect MF changes below 50 nT and thresholds of 10 nT have been suggested. Candidate primary interaction mechanisms centre on magnetic particles in the body and action by the Radical Pair Mechanism, RPM in cryptochrome protein molecules. Overall, patterned or randomly varying MFs at levels below 100 nT appear to be particularly biologically active. Thus, current knowledge provides candidate causal pathways from EMF exposure to disease. Magnetic particles in the human body, notably in the brain and blood ferritin, and RPM action on cryptochromes both transduce low intensity MFs producing initial biological responses. Thereafter, the extensive reports of MF-induced Ca<sup>2+</sup> efflux, gene expression, ROS release by cells and circadian rhythm disruption, represent causal pathways to MF-induced disease. The recent report of MF-induced Genomic Instability in cells is particularly relevant to cancer (Luukkonen et al Mutation Research 760 (2014):33- 41). The complete lack of scientific understanding by SCENIHR of how MFs interact with biological systems in a manner which causes the widely reported health effects makes the preliminary opinion unrescuable and it should be abandoned. A minimum requirement for a new form of EMF health assessment should include: (i) Equal opportunity and open process for</p> | <p>(ii) Initial literature search is contracted to an external company. The inclusion and exclusion criteria for scientific papers have been described in detail in the Opinion.</p> <p>(iii) All Opinions are published for public consultation which aims to improve scientific basis of the opinion. Interested scientists are informed about the consultation through an active dissemination process which includes e-news, website announcements and ad hoc meetings. Comments received are published.</p> <p>(iv) The scientists working for the Scientific Committees, in their respective roles (members, external experts), fully meet the requirements set in the Rules of Procedures of the Scientific Committees. These Rules of Procedures are publicly available on the website as are the declarations of interest from each scientist working for the Scientific Committees, according to the transparency policy of the Committees.</p> |
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|  |                              | <p>appointment of committee members; (ii) Focus on the science of Bioelectromagnetics as a whole; (iii) Blind independent peer-review of SCENIHR Reports with publication of reviewers comments; (iv) Industry influence &amp; lobbying to be made fully transparent.</p>   |  |
| <p>11. Zinelis, Stelios, Hellenic Cancer Society-Annex Ceffalonia, Greece, zinelis@otenet.gr, Greece</p> | <p>2. TERMS OF REFERENCE</p> | <p>Executive Page 10 Lines 14 states "Not all identified studies are necessarily included in the opinion"</p> <p>This Report should be a comprehensive review of all published papers and not only selected papers. It is very important to have a such review because the decisions may have consequences to public health.</p> <p>Page 10 Line 23-26 states "... there have been ... studies dealing with exposure directly from a mobile phone. In almost all cases these experiments are without relevance...."</p> <p>Studies dealing with exposure from mobile phones should not be excluded. The mobile phones are using radiation which the limits of frequency, intensity etc are known and are approved. The mission of the committee is to evaluate the risks of this setting and not which frequency or intensity is causing problems. Page 10 Line 45-47 states "...the lack of clearly focused working hypotheses for chosen biological endpoints is accentuated by the lack of an established biological or biophysical mechanism of action at environmental exposure levels." Even though some mechanisms have been</p> | <p>The inclusion and exclusion criteria for scientific papers have been described in detail in the Opinion. In the list of references there is a list of literature identified but not cited.</p> <p>These studies have been excluded because they are lacking rigorous dosimetry and are, therefore, difficult, if not impossible, to replicate.</p> <p>The SCENIHR considers that no changes in the text are required.</p> |

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|  |                         | documented still understanding the mechanism first and than plan for better protection it is not necessary, since we may not know the full answer for many-many years. Mechanisms is not known for many conditions still protection, advice and treatment is given.   |  |
| 12. No agreement to disclose personal data                                     | 3. SCIENTIFIC RATIONALE | p. 18, line 2 SCENIHR 2010 should be (SCENIHR 2012) "Memorandum on the use of the scientific literature for human health risk assessment purposes – weighing of evidence and expression of uncertainty"<br>Also references to all SCENIHR documents should be added to the Reference List.  | The text has been modified accordingly.  |
| 13. Flynn, Angela, Green Evolution,<br>angelaflynn80@msn.com,<br>United States | 3. SCIENTIFIC RATIONALE | Please, millions of people are proof of this. Think of exposure to the slightly higher in frequency EMR from sunlight. No two people have the same sensitivity. More prolonged and more intense exposure leads to more severe health damaging effects. Some of these effects only become apparent after the exposure is over. Recovery requires complete avoidance of exposure until the body has healed. It really is common sense. All life is electrosensitive. I find that I cannot sleep if I am in a high EMF/RF environment even if the exposure is limited to the daytime. I use RF shielding when I travel to avoid high exposure and this helps, but I do best if I have no RF transmitters nearby and turn off circuits at night. I realized this in 2007 and therefore have years of trial and error to confirm this. | This is a personal view not supported by scientific evidence; no changes in the text are required. |

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| 14. v Gils Jan, NPS,<br>jgvgils@gmail.com,<br>Netherlands       | 3. SCIENTIFIC<br>RATIONALE  | <br>To The European<br>Commission 2.pdf  | The literature cut-off date was extended and the additional literature has been considered.  |
| 15. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.10. Health effects<br>from combined<br>exposures to<br>different EMFs | 30 Opinion should consider to add as well as the combination of signal effects and harmonics.   | This is already considered in the text.<br><br>No changes in the text are required.  |
| 16. Monks Ethna,<br>monks.e@hotmail.com,<br>Ireland             | 3.10. Health effects<br>from combined<br>exposures to<br>different EMFs | As a citizen of Europe and therefore a stakeholder in its affairs I wish to submit a scientific reference related to the problem I currently suffer from i.e. The Microwave Auditory Effect or the hearing of microwave pulses. The main symptoms of this are sleep deprivation, headaches and difficulties in concentrating. My first experience of this effect was triggered when the electrical voltage in my village was doubled. I believe that this event combined with the nearby radio mast and possibly even the wind turbines played a part in its instigation. Moving to my current address after being diagnosed with cancer, which I link to the experience, there was no sensation of resonance in my head and a hearing test was undertaken, which demonstrated that tinnitus was not the issue. Upon the installation of water meters outside every house in my town, eighteen months after changing address, the microwave hearing returned. These meters are based on a mesh system, use radio transmitters and are read wirelessly. I believe that these were the trigger for my current situation. Other effects of the | This is a personal view, not supported by scientific evidence; no change in the text is required.<br><br>A note on anecdotal evidence has been added to section 3.2 Methodology. |

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|  |   | <p>pervasive and ever growing invasion of Eletromagnetic/Radio frequency fields (EMF/RF) are darting pains in different parts of my body and problems with my eyes. These however are nothing compared with the main problems.</p> <p>Previous scientific responses to the risks of EMF/RF indicate that there are no adverse long or short-term effects from exposure to EMF/RF, yet I am aware of at least 25 other citizens who suffer similar and diverse effects. There appears to be a deficiency in researching this subject with e.g. no research undertaken on the non-thermal effects or on the accumulative effects. There also appears to be a 'blind-spot' in relation to research undertaken by well-respected individual scientists who have identified what might be considered negative results by interested industrialists. This situation seems to indicate a growing gap between what might be termed industrial science for those whose interest is profit, and real science with an emphasis on the common good. Please see attached to understand my plight. I am not a scientist or technical expert but someone who has the, just as important, lived experience of the effects of EMF/RF.</p> |  |
| <p>17. Monks Ethna,<br/>monks.e@hotmail.com,<br/>Ireland</p> | <p>3.10. Health effects from combined exposures to different EMFs</p> | <p>Yesterday I forwarded a submission regarding one of the affects of electromagnetic/radiofrequency fields i.e. the Microwave Auditory Effect. Having made contact with a number of other sufferers in the meantime and taking into account the fact that</p>   | <p>The references are from 2006 or earlier and hence fall outside the remit of this update. No changes in the text are required.</p> |

their diverse impairments do not allow them to submit information online, I am attaching two further pieces of information regarding these. The first is in relation to a woman who developed cataracts and is slowly going blind. The information contained below relates to information on radiation-induced cataracts contained in Bob DeMatteo's book Terminal Shock, the Health Hazards of Video Display Terminals (1986). The second attachment is a presentation to the Houses of the Oireachtas (Irish Parliament and Senate), Joint Committee on Health and Children, on 2nd February 2006 entitled Communications Masts: Presentation. This was presented by a group of people from the Irish Electromagnetic Radiation Victims Network i.e. a group of people who suffer diverse illnesses from electromagnetic/radio frequency fields. Some sufferers, who suffer both from microwave/low frequency hearing as well as physical affects, are forced to live nomadic lives in order to find places where adverse affects are least experienced and sleep might be possible. Please note that in order for the process of public consultation to be seen to be democratic, written submissions should be accepted as many people are not in a position to use computers due to electromagnetic/radio frequency induced illnesses. In DeMatteo's book he "tells of health problems related to working with VDUS: strange clusters of miscarriages among women from different

This suggestion is forwarded to the Commission to be considered for the future organisation of public consultations. However, the aim of the public consultation is to improve the scientific basis of the opinion; risk management, political and personal considerations are outside its scope.

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|   |  | workplaces, premature births and children born with deformities, cases of cataracts in the back part of the lens capsule in the eye, headaches, tiredness, sleeping problems... Cataracts, in particular, caught my attention. In his book, Bob DeMatteo wrote that many radiation-induced cataracts had been reported among VDU operators in North America, the first cases as early as 1977. Two New York Times copy editors, aged 29 and 35, had been diagnosed as having developed cataracts on the back surface of the lens capsule, a location that, according to DeMatteo, is an objective sign of radiation-induced injury. He mentioned that this particular kind of cataract is prevalent among people exposed to radio frequencies and microwaves. For continuation see attached. |   |
| 18. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom                                   | 3.11.1. Animal studies                         | P161 22 The inclusion of this research is questionable which infers subjects would need to undergo ionising radiation before protective element of rf fields counteract it. It is not informative for purposes of assessment for the general public in everyday situations. However, their study with more severe hematopoietic pathologic alterations would be more appropriate for the purposes of assessment.   | The inclusion criteria have been described in the Opinion.<br><br>No changes in the text are required.  |
| 19. Keevil Stephen, European Society of Radiology,<br>stephen.keevil@kcl.ac.uk,<br>United Kingdom | 3.12. EMF effects on implanted medical devices | It is perhaps worth mentioning that the possibility of interactions between EMF used in MRI and biomedical implants is well understood in the MRI community. It is addressed in a recent international standard (ISO:TS 10974:2012) as   | The problem of the interference of EMF with medical implants has been addressed in the Opinion both for workers and patients. No changes in the |

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|   |  | well as in a forthcoming amendment to IEC 60601-2-33 ed 2: 2010 (the standard covering MRI equipment).  | text are required.   |
| 20. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom                 | 3.12. EMF effects on implanted medical devices | P170 11 interference is cited as causing displacement of ferromagnetic implants and should be taken into account with the ferromagnetic nature of the heart so provides suggestion of a mechanism 28 interference will happen when sympathetic resonance occurs which is as recognised by ICNIRP as "windows" of frequencies and "windows" of voltages, that being the ones that resonate with candidate's own heartwave frequencies and voltage rather than ICNIRP's threshold limits. | This is a personal view, not supported by scientific evidence; no changes in the text are required.                          |
| 21. O'Dea Pascal, Pylon Alternatives Alliance,<br>pkodea@eircom.net,<br>Ireland | 3.12. EMF effects on implanted medical devices | As a medical doctor /family practitioner with approximately 1.3 patients per thousand in my practice with implantable cardiac pacemakers ie ten patients and at least two additional patients with ICD devices I would request the committee to offer risk assessment advice for this large cohort of patients potentially at serious risk of interference with their life saving devices from emf from high voltage overhead power lines,  | Interference with medical devices is beyond the mandate for the current opinion.<br><br>No changes in the text are required. |
| 22. Souques, Martine, EDF,<br>martine.souques@edf.fr,<br>France                 | 3.12. EMF effects on implanted medical devices | the only references cited are those of Tiikkaja. There are others to take into account: for example (see the FEMU database)<br>- Babouri A et al. Experimental and theoretical investigation of implantable cardiac pacemaker exposed to low frequency magnetic field. Journal of Clinical Monitoring and Computing (2009)  | The references have been included in the Opinion and the text was changed accordingly.                                       |




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|  |                                   | <p>23:63-73.</p> <p>- Joosten S et al. The influence of anatomical and physiological parameters on the interference voltage at the input of unipolar cardiac pacemaker in low frequency electric fields. Phys. Med. Biol., 2009, 54 (3): 591-609.</p> <p>- Korpinen L et al. Cardiac pacemakers in electric and magnetic fields of 400-kV power lines. Pacing Clin Electrophysiol. 2012 Apr;35(4):422-30.</p> <p>-Souques M et al. Implantable cardioverter defibrillator and 50-Hz electric and magnetic fields exposure in the workplace. Int Arch Occup Environ Health, 2011, 84: 1-6</p> <p>-Seidman SJ et al. In vitro tests reveal sample radiofrequency identification readers inducing clinically significant electromagnetic interference to implantable pacemakers and implantable cardioverter-defibrillators. Heart Rhythm, 2010. 7(1): p. 99-107.</p> |  |
| 23. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom  | 3.13. Research<br>recommendations | P170 50 biophysical interaction mechanisms have been identified by physics principles as superposition so that resting rates and interval ratio calculations can be applied to avoid dominance of external field.  | The SCENIHR does not agree. No change in the text is required. |
| 24. Souques Martine, French<br>RadioProtection Society<br>(SFRP) - Non Ionizing<br>Radiation Section,<br>section.rni.sfrp@gmail.com,<br>France | 3.13. Research<br>recommendations | Page 171, line 1: identified<br>Page 171, line 26: number of examinations<br>Page 173, line 5: The available evidence regarding ... in children does not   | These typos have been corrected.                               |


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| <p>25. Keevil, Stephen,<br/>European Society of<br/>Radiology,<br/>stephen.keevil@kcl.ac.uk,<br/>United Kingdom</p> | <p>3.13.1. Static fields<br/>including MRI<br/>exposure</p> | <p>We note that nine of the research recommendations relate directly or indirectly to MRI. Several epidemiological studies are under way or being planned in the context of MRI, but feasibility remains uncertain because of the likely small size of any effect, which may not exceed that of uncontrolled confounding factors, the difficulty of estimating exposure in retrospective studies and the likely long time scale of prospective studies. Meanwhile the fact that such studies are being undertaken raises doubts among patients and workers as to the safety of MRI procedures, and so undermines public confidence in an imaging technique with unprecedented medical impact and potential. This is not to say that this work should not be undertaken, but it needs to be made clear that it is not motivated by any existing evidence of adverse effects.</p> | <p>The comment was taken into account and the text was changed accordingly.</p>                                 |
| <p>26. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p>  | <p>3.13.1. Static fields<br/>including MRI<br/>exposure</p> | <p>P171 13 perception, annoyance and other effects have been linked to varying ion concentrations which could be a useful biomarker for EHS persons who perceive their senses, experience annoyance and other effects which could indicate varying ion concentrations are taking place.</p>   | <p>The SCENIHR considers that no changes in the text are required.</p>  |
| <p>27. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p>  | <p>3.13.2. ELF fields</p>                                   | <p>P172 18 Provocation studies have identified single participants who have reacted to electric or magnetic fields and this would indicate it is the ELF field or harmonics created from mixed signals which cause symptoms rather than psychological cause.</p>  | <p>The provocation studies are already referenced in the text (3.6.3.1). No change in the text is required.</p> |

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| <p>28. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p> | <p>3.13.4. RF fields</p> | <p>P172 44 Opinion states that children and mobiles should be tested but WIFI needs to be configured into tests which are present in most schools and whilst are considered low may well be within the "window" to create effects and thus distort any studies.</p> <p>P173 31 Opinion is the most astute consideration of missing variables in tests. It could also note frequencies &amp; voltages of the human system and use brainmapping for neurophysiological parameters.</p> <p>43 Opinion that a low priority is given to finding the mechanism for EHS persons also has a bearing on every human as it could be the same mechanism but at a subtler level and so have implications for every living being. Therefore it is strongly opposed that our lives &amp; potentially others are given a low priority. Besides many mechanisms have been identified in this paper which could be very cheaply replicated to source sensitive EHS persons.</p> | <p>The text has been changed for the sake of clarity.</p>           |
| <p>29. Rowley Jack, GSMA,<br/>jrowley@gsma.com,<br/>United Kingdom</p>   | <p>3.13.4. RF fields</p> | <p>3.13.4. RF fields p. 172, line 43. Similar to line 36 on the same page and in the interests of greater clarity we suggest amending the sentence at line 43 to implicitly reference the CEFALO study (reviewed on p. 61, lines 24-38) as follows:<br/>'While the only available study found no increased risk whether children show an increased tumour risk to RF fields remains unclear.'</p>  | <p>The comment was taken into account and the text was changed.</p> |

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| <p>30. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National Program Committee on NIR Protection), michelisrael@abv.bg, Bulgaria</p> | <p>3.14. Guidance on research methods</p> | <p>About the need of methodological guide for quality of science, we proposed the development of such guide for harmonization of standards (exposure limits) in the early 2000. Our concept has been presented at several scientific forums in the last decade. Nevertheless that our suggestion is for creation of Methodological Guide for standards, the idea and methodology for gathering specialists for working groups, exchanging information, and for the process of developing this guide is similar.</p>  | <p>No changes in the text are required.</p> <p>It is outside the scope of this committee to produce a detailed guidance on research good practices in the area of bioelectromagnetics.</p>  |
| <p>31. <i>No agreement to disclose personal data</i></p>  | <p>3.2. Methodology</p>                   | <p>In accordance with standard practice for comprehensive reviews published in peer-reviewed journals, the search terms and databases searched should be identified. Provide requested information and check to see that all relevant studies are reviewed. Other studies identified but not reviewed would be listed as Literature identified but not cited.</p>  | <p>This comment is already addressed in section "3.2. Methodology". No changes in the text are required.</p>  |
| <p>32. Bevington Michael, ElectroSensitivity UK, michael@es-uk.info, United Kingdom</p>   | <p>3.2. Methodology</p>                   | <p>(a) The Opinion is on health effects, not frequencies. It should categorise by health effects, not frequencies (as BioInitiative 2012) because (i) health effects are often independent of frequencies; (ii) WiFi, MRI, mobile and cordless phones all combine ELF and RF; (iii) many studies use phones, MRI or WiFi; (iv) IEI-EMF is idiopathic with individual effects at combinations of frequencies; (v) studies often test biological outcomes not frequencies.</p> <p>(b) The Opinion accepts that IEI-EMF exists, but omits effects established pre-2009 (IEI microwave hearing 1961; IEI-EMF objective physiological</p> | <p>(a) The Opinion already takes into account all health points within each frequency range. No changes in the text are required.</p> <p>(b) The established effect of microwave hearing has been already considered in ICNIRP (1998). Everyday exposure is below the threshold for inducing this effect. It is not clear which other established "objective physiological effects" are meant, because no literature is given. No changes in the text are required.</p> |

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|  |                         | <p>effects 1960s).</p> <p>(c) It omits 'social well-being' (WHO) from IEI-EMF: sufferers can lose job, home etc and be denied access to shops, schools, hospitals etc (Genius 2010, Genius &amp; Lipp 2011; Kato &amp; Johansson 2012; Hagstrom et al 2012).</p> <p>(d) It omits IEI-EMF 'refugees' seeking suitable housing and 'White Zones' (Boyd et al 2012)</p> | <p>(c) and (d) The Opinion examines whether there are physiological effects that result from exposure to EMF. We are in no doubt that some people who attribute symptoms to EMF have a very poor quality of life, be this measured in terms of social isolation, access to facilities, mental health or other aspects of well-being. However, this in itself is not evidence that their poor health is directly caused by exposure to EMF.</p> |
| <p>33. Le Calvez Janine,<br/>PRIARTEM,<br/>contact@priartem.fr,<br/>France</p> | <p>3.2. Methodology</p> |  <p>Courrier Priartem au<br/>DG SANCO - rapport  </p>   | <p>The scientists working for the Scientific Committees, in their respective roles (members, external experts), fully meet the requirements set in the Rules of Procedures of the Scientific Committees. These Rules of Procedures are publicly available on the website, as well as the declaration of interest of each scientist working for the Scientific Committees, according to the transparency policy of the Committees.</p>          |
| <p>34. Rowley Jack, GSMA,<br/>jrowley@gsma.com,<br/>United Kingdom</p>         | <p>3.2. Methodology</p> | <p>3.2 Methodology p. 17, lines 49-51. The GSMA welcomes the additional information on the methodology used to produce the report. The identification of research that was uninformative will aid transparency and understanding.</p>  | <p>This is a general comment.<br/>No changes in the text are required.</p>   |
| <p>35. Silk Anne, Silk Research<br/>Trust,<br/>annesilk@waitrose.com,</p>      | <p>3.2. Methodology</p> | <p>Variations In Description Of Electromagnetic Spectrum In Use By Varying Authorities. Are we all speaking the same language?</p>   | <p>The frequency bands are given in the text.<br/><br/>No changes in the text are required.</p>  |

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| United Kingdom  |                      |  |   |
| 36. Souques, Martine, EDF,<br>martine.souques@edf.fr,<br>France   | 3.2. Methodology     | page 19, line 10: Exposure outside the home must also be taken into account. There are numerous exposure sources outside the home, including, for example, various types of transportation. Page 20-22: a very good analysis of the statistical methods. It is a shame that it is not always applied in the rest of the report. Page 20: 'The problem of dose assessment in epidemiology has not been taken into account...questions about how exposure is accumulated over many years need to answered'. No experimental data has made it possible to demonstrate the existence — or even the plausibility — of a cumulative effect of ELF EMFs. This is nonetheless a fundamental hypothesis of the epidemiologic studies. | These points have already been addressed in the text.<br><br>No changes in the text are required. |
| 37. Brooker Ian, Tyco,<br>ibrooker@tycoint.com,<br>United Kingdom | 3.3. Exposure to EMF | Section 3.3, Page 23, Lines 44-46. It is important to note that the derived reference levels or action values may also include additional safety factors or be highly conservative in nature.  | The text has been modified accordingly.   |
| 38. Brooker Ian, Tyco,<br>ibrooker@tycoint.com,<br>United Kingdom | 3.3. Exposure to EMF | Section 3.3, Page 24, Line 39. Please add that "if an action value is exceeded, it does not necessarily follow that the exposure limit value is also exceeded. Under such circumstances, however, there is a need to establish whether there is respect of the exposure limit value. "   | The text has been modified accordingly.   |
| 39. <i>No agreement to disclose personal data</i>                 | 3.3. Exposure to EMF | The main problems I have noted are interference with deep restful sleep including manufacture of   | This is a personal view not supported by scientific evidence.                                     |

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|  |                      | melatonin which then starts to weaken the immune system and hormonal system, along with a type of adult attention deficit disorder, restlessness, difficulty concentrating, deteriorating of eyesight, hair loss, premature ageing, and all this, of course, makes it hard for a person to work and support themselves, let alone concentrate and get things that require concentration completed. Ringing in the ears when in the vicinity of is one indicator and can nearly drive a person batty. Digestive difficulties ensue as well.        | No changes in the text are required.  |
| 40. Jamieson Dr Isaac,<br>Biosustainable Design,<br>isaac@biosustainabledesign.org, United Kingdom | 3.3. Exposure to EMF | Brief commentary on smart meters, 60 Ghz technology and 4G is attached, as is a document on international guidelines and best practice. A separate larger document I prepared on smart meters as related to health matters, etc., is downloadable separately at:<br><a href="https://www.dropbox.com/s/njrbcbglv0gkpfx/BC0130124A_IAJ%282%29.pdf">https://www.dropbox.com/s/njrbcbglv0gkpfx/BC0130124A_IAJ%282%29.pdf</a><br><br>IAJ_smart_meters_60GHz_4G.docx | Research recommendations had already been included in the text.<br><br>The inclusion and exclusion criteria have been described in the Opinion.<br><br>Risk management is outside the scope of the Opinion. |
| 41. Morgan L Lloyd,<br>Environmental Health Trust,<br>Lloyd.L.Morgan@gmail.com, United States      | 3.3. Exposure to EMF | Rebuttal of CTIA's Cellular Telecommunications Industry Association's (CTIA) Submission to the Federal Communication Commission Submission (FCC) Submission Submitted to the FCC.   | The comment is outside the scope of the Opinion.<br><br>No changes in the text are required.  |
| 42. Souques Martine, French RadioProtection Society  | 3.3. Exposure to     | Page 23, line 28-30: Not clear : the Directive 2013/35/EU is based on the 2010 ICNIRP guide for   | Comments have been considered relevant and the text has been modified   |

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| <p>(SFRP) - Non Ionizing Radiation Section,<br/>section.rni.sfrp@gmail.com, France</p>         | <p>EMF</p>  | <p>LF and 1998 ICNIRP guide for HF with two semantic differences : The Directive prefers used Exposure Limit Value (ELV) instead basic restrictions and Action Level (AL) instead reference level.</p> <p>Page 35, line 5-9: Not in line with the new Directive where the ELV is 2 T (normal working conditions).</p> <p>Page 36, line 1-7: Not in line with the new Directive where there is several level depending on the body part. In short, the AL at 50 Hz is 1 mT for the head, 6 mT for the trunk and 18 mT for the limbs. The AL for head and trunk is 100 µT from 3 kHz to 10 MHz and 300 µT for limbs at these frequencies.</p> <p>Page 37, line 15-27: There is no more ambiguity: The new Directive indicates the shape of the magnetic field shall be taking into account using the WPM (weighted peak method in the time domain). The levels (AL or ELV) are higher than those in the previous Directive (04/40) but the criteria is stricter. Workers are more protected globally. Averaging is allowed for thermal effects only.</p> | <p>accordingly.</p>   |
| <p>43. Azevedo Filipa, European Parliament,<br/>filipa.azevedo@europarl.europa.eu, Belgium</p> | <p>3.3.1. Wireless communication technologies (incl. dosimetry)</p> | <p>Line 51 - Title: "Mobile phone base stations"; paragraph 5 "for macrocells distance from the base station is a bad proxy for exposure". Why? if we know that the electromagnetic field fall off with distance? Considering the antennas installed in urban areas, why there isn't a minimum distance between a base station or an antenna and homes?</p>  | <p>In reality we do not have the free (empty) space propagation model that you describe in the comment. In a built environment there are complex physical phenomena (reflection, transmission, diffraction) that take place, therefore the distance is not a good proxy for</p> |




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|   |   | <p>- no mention of this factor on your Opinion. I could also not find a minimum height for an antenna. This is a real environmental concern, since the non-discriminatory manner in which base stations (antennas) are sited in close proximity to homes increases the exposure level in such environments and this should be further studied. (To summarise: there is no minimum distance between homes and antennas; no minimum height of the antenna; no guidelines regarding the roofs or buildings where the antennas are installed, etc - all these factors can have an impact when measuring the health risks of EMF.</p>   | <p>exposure. It has been shown in Schüz and Mann (2000) where power density measurements of the radiation from a specific mobile phone base station at several locations did not correlate with the distance from it. The rest of the comment pertains to risk management and policy, which is outside the scope of this committee.</p> <p>Therefore, no changes in the text are required.</p> |
| <p>44. COMLEKCI Selcuk,<br/>Suleyman Demirel<br/>University,<br/>scom56@gmail.com,<br/>Turkey</p> | <p>3.3.1. Wireless<br/>communication<br/>technologies (incl.<br/>dosimetry)</p> | <p>The aim of this study was to investigate the effects of a 2450 MHz electromagnetic field (EMF) (wireless internet frequency) on the growth and development of female Wistar rats. The study was conducted on three groups of rats. The prenatal and postnatal groups were exposed to EMF 1 h/day beginning from intrauterine and postnatal periods, respectively. The third group was the sham-exposed group. Growth, nutrition and vaginal opening (VO) were regularly monitored. Serum and tissue specimens were collected at puberty. Histological examinations, total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) measurements in ovary and brain tissues and also immunohistochemical staining of the hypothalamus were performed besides the determination of serum FSH, LH, E2 and IGF-1 values. Birth masses of the groups were</p> | <p>The cut-off date for the literature review was extended and the study has been considered in the appropriate section.</p>   |

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|   |   | <p>similar (<math>p &gt; 0.05</math>). Mass gain per day was significantly lower and the puberty was significantly later in the prenatal group. Brain and ovary TOS and OSI values in the prenatal group were significantly increased (<math>p &lt; 0.05</math>). Histological examinations of the specimens revealed no statistically significant difference between the groups (<math>p &gt; 0.05</math>). Exposure to 2450 MHz EMF, particularly in the prenatal period, resulted in postnatal growth restriction and delayed puberty in female Wistar rats. Increased TOS and OSI values in the brain and ovary tissues can be interpreted as a sign of chronic stress induced by EMF. This is the first longitudinal study which investigates the effects of EMF induced by wireless internet on pubertal development beside growth.</p> |  |
| <p>45. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National Program Committee on NIR Protection), michelisrael@abv.bg, Bulgaria</p> | <p>3.3.1. Wireless communication technologies (incl. dosimetry)</p> | <p>The data could be added to 3.3 Exposure to EMF/Base stations. After line 21 on p.30 There are many publications in the last years about the risk of radiofrequency (RF) exposure to the general population from base stations for mobile communication. Unfortunately, very few of them concern the risk to the personnel mounting and maintaining these systems. Here, we present a pilot study of the exposure to the personnel in selected objects with different types of antennae mounting. Nevertheless, that they are published before 2009 we have not discovered such data in the report.</p> <p>The results of our study of EMF exposure of</p>  | <p>This comment is outside the scope of the opinion.</p> <p>No changes in the text are required.</p> |

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|   |  | operators mounting adjusting and maintaining base stations show that the values depend on operation position and type of the antennae mounting. The values are from 0.001 W/kg to 0.244 W/kg.  |  |
| 46. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom               | 3.3.1. Wireless communication technologies (incl. dosimetry) | <p>P28 7 whilst being distant from the source of an emf field, the atmosphere falls to background levels, these areas where there are just background levels are not accessible to the general public to live or work in so they do not represent an everyday experience &amp; as such would be a bad proxy for exposure calculations.</p> <p>P30 44 Whilst comparing analogue cordless phones to DECT it omits to mention that analogue phones emit a natural sine wave as opposed to digital which is relevant.</p> <p>49 Calculations fail to consider empirical factors by averaging the burst peak power where in fact the peripheral nervous system &amp; central nervous system do not experience the energy/joule bursts in an average way but by the quality of each impulse strength.</p> <p>50 DECT phones operate at 5Ghz to my knowledge so that their average power exceeds that of mobile phones.</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>DECT phones do not operate at 5GHz.</p>  |
| 47. MARGARITIS LUKAS,<br>ATHENS UNIVERSITY,<br>lmargar@biol.uoa.gr,<br>Greece | 3.3.1. Wireless communication technologies (incl. dosimetry) | <p>SCENIHR has omitted studies that used mobile phones as exposure devices. I object since these studies have been published after peer reviewing in high quality journals. Besides, in real conditions people are exposed to mobile phones. Dosimetry in most of these publications is</p>  | <ol style="list-style-type: none"> <li>1. The inclusion and exclusion criteria have been described in the Opinion.</li> <li>2. Risk management is outside the scope of the Opinion.</li> </ol> |

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|  |  | <p>described adequately to be replicated in other laboratories. In fact the number of studies in general that have been replicated by another lab is very limited. Positive and negative studies have been treated differently. It is not clear in the opinion how many studies are needed to decide for sure that EMF is dangerous at ICNIRP's levels and why the precautionary principle is not adopted until the issue is solved (which seems unlike for the next decades given the complexity of exposure parameters and the biological systems). TOO MANY STUDIES WITH GOOD DOSIMETRY HAVE NOT BEEN TAKEN INTO CONSIDERATION BY SCENIHR, such as;</p> <p>A) Studies using DECT cordless devices. Unlike cell phones that emit a variable intensity profile depending on the communication parameters, cordless phones have stable and repetitive pulsed signals. Therefore dosimetry is possible.</p> <p>B) There is a large accumulation of oxidative stress publications that were not considered in the opinion.</p> <p>C) Wi-Fi and baby monitor studies also omitted</p> <p>SUGGESTIONS</p> <p>1. All published papers should be included at least in a references section. 2. TRAN EUROPEAN CONCERTED RESEARCH EFFORTS: Groups dedicated to EMF research for more than 5 years as proved by their publications should be supported to implement cause-effect experiments on humans, animal models and cell cultures using</p> | <p>3. Sections 3.10 and 3.11 of the Opinion address combined exposure.</p> |
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|  |   | <p>identical exposure conditions and complementary approaches. The exposure duration should vary from a few minutes up to several hours per day to mimic human exposure conditions.</p> <p>3. EXPOSURE BY MORE THAN ONE EMF SOURCE IN RESEARCH EFFORTS. Since the majority of people are exposed in more than one source combined exposures should be performed.</p>  |  |
| <p>48. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom</p>   | <p>3.3.1. Wireless communication technologies (incl. dosimetry)</p> | <p>3.3.1. Wireless communication technologies (incl. dosimetry) p. 30, line 6. The study of Tell and Mantiply (1980) has been updated in respect of methodology and presents some preliminary findings:</p> <ul style="list-style-type: none"> <li>• A survey of the urban radiofrequency (RF) environment, Tell et al., Radiation Protection Dosimetry, Published online: February 23, 2014. p. 32, line 46. There are additional studies on smart meter exposure of potential relevance:</li> <li>• A Study of RF Dosimetry from Exposure to an AMI Smart Meter, Zhou et al., IEEE Antennas and Propagation Magazine,, 54(6):69-80, December 2012.</li> <li>• Radiofrequency Energy Exposure from the Trilliant Smart Meter, Foster et al., Health Physics, 105(2):177-186, August 2013.</li> </ul> | <p>The literature cut-off date was extended and the additional literature has been considered.</p> |
| <p>49. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom</p> | <p>3.3.10. Conclusions on exposure to EMF</p>                       | <p>P48</p> <p>4 It would only be fair to say the outdoor exposure is dominated by mobile communications whilst the dominating presence indoors can be from WIFI applications within homes, libraries, public buildings.</p>   | <p>The SCENIHR considers that no changes in the text are required.</p>                             |

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|   |   | <p>13 It is not true to state EMF cannot be distinguished. EMF can be detected &amp; distinguished from background sources even farther away because it has an irregular energy pulse which switches voltage levels quickly &amp; irratically as confirmed by EMF monitor. Background radiation alone is measured as a low steady often completely unchanging field. P48 19 -23 in the higher frequencies of RF i.e. microwaves it should be noted that microwaves act at the molecular level on water so that the changes may begin from the internal, inside to out so the opinion that only superficial tissues are of concern is not validated.</p> |   |
| <p>50. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p>                  | <p>3.3.10. Conclusions on exposure to EMF</p> | <p>P48 40 Opinion with 3 ambiguous factors does not offer useful information in assessing safety. i.e. expectations offers no surety, average exposure conceals individual exposure, general public does not cover persons with any medical predisposition or health condition.</p> <p>44 Agree wholeheartedly that multiple sources should be taken into account as this is the real life everyday exposure as well as allowances for organ defects so that the biosystem can withstand exposure rates.</p>  | <p>The SCENIHR considers that no changes in the text are required.</p>  |
| <p>51. Thompson S, ES<br/>Teachers,<br/>esteachers@btinternet.com,<br/>United Kingdom</p> | <p>3.3.10. Conclusions on exposure to EMF</p> | <p>p48 Line 28-47</p>  <p>Report on case studies Final copy Oct</p>  | <p>The data provided are anecdotal and do not meet the scientific criteria for inclusion.</p> <p>No changes in the text are required.</p> |

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| <p>52. Keevil Stephen, European Society of Radiology, stephen.keevil@kcl.ac.uk, United Kingdom</p> | <p>3.3.2. Industrial applications</p> | <p>P35 line 8-9. It is stated that the maximum level of static magnetic field exposure is 'about 1T', and that 'nurses/technicians... can be exposed to up to 0.2 T, approaching the protection guideline'. In fact, it has been established that a much wider range of staff groups can exceed ICNIRP guidelines for exposure to static magnetic field, IF and possibly RF fields, without any evidence of ill effects. It must be borne in mind that ICNIRP generally employs safety factors when setting exposure limits, so that exposure to well-characterised EMF some way above the exposure limits is possible before effects are encountered. This is the situation in MRI, where safety is assured through adherence to IEC standard 60601-2-33 ed 3: 2010.</p> | <p>The text has been changed accordingly.</p>   |
| <p>53. Nayström Peter, Swedish Foundry Association, peter.naystrom@swerea.se, Sweden</p>           | <p>3.3.2. Industrial applications</p> | <p>Page 36 line 1-7. There is a misprint. The levels comes from the ICNIRP 1998 which has now been replaced by 2010 and it is also used in the EU directive. This must be corrected in the final version.</p>   | <p>The text has been changed accordingly.<br/><br/>The values for occupational exposure in ICNIRP (1998) were used. These have been updated to values from ICNIRP (2010).</p> |
| <p>54. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom</p>                                     | <p>3.3.2. Industrial applications</p> | <p>3.3.2. Industrial applications p. 35, lines 28-40. The following papers may be of relevance:</p> <ul style="list-style-type: none"> <li>• SAR Exposure From UHF RFID Reader in Adult, Child, Pregnant Woman, and Fetus Anatomical Models, Fiocchi et al., Bioelectromagnetics, 34(6):443-452, September 2013.</li> <li>• Radiofrequency Identification Systems for Healthcare: A Case Study on Electromagnetic Exposures, Festa et al., Journal of Clinical</li> </ul>   | <p>The literature cut-off date was extended and additional literature has been considered.</p>  |

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|  |                                | Engineering, 38(3):125-133, July/September 2013.  |  |
| 55. Souques Martine, EDF, martine.souques@edf.fr, France   | 3.3.2. Industrial applications | Page 34: There is a copy error in the table. In the ELF column, the '°°' is missing for the 'electricity supply network' page 36 line 6: these values come from the 1998 ICNIRP guidelines. They should be replaced by the values from the 2010 ICNIRP guidelines.<br>Page 37 line 20: replace by directive 2013/35/EU<br>Page 37 line 22: replace [3] by the correct reference (IEEE, 2002).   | The text has been changed accordingly.   |
| 56. Brooker Ian, Tyco, ibrooker@tycoint.com, United Kingdom  | 3.3.3. Medical applications    | Section 3.3.3, Page 39, Lines 48-50. Please note that the EN45502 series of AIMD standards use a level of 1mT not 0.5 mT for static field protection.   | The text is not contradictory to the comment. No change to the text is required. |
| 57. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National Program Committee on NIR Protection), michelisrael@abv.bg, Bulgaria | 3.3.3. Medical applications    | The data could be added to 3.3 Exposure to EMF/Medical Applications/MRI. After line 48 on p.39 For the electromagnetic fields in MRI we propose data of our study of MF in MRI premises (1.5 T): the average values are as follows: 159.92 mT on 20 cm from the gentry; 44.56 mT on 50 cm from the gentry; 22.97 mT on 100 cm from the gentry. We have in Bulgaria experience with measurements and exposure assessment of different types of MRI equipment. Here, results for only the most frequently used type of equipment 1.5 T are presented. | The study suggested does not fulfil the inclusion criteria.                      |
| 58. Keevil Stephen, European Society of Radiology, stephen.keevil@kcl.ac.uk,   | 3.3.3. Medical applications    | P39 line 27. A gradient exposure limit of 50 T/s is mentioned in the context of MRI, to avoid PNS. On p30 it is recorded that 70 T/s has been measured  | This is an informative comment, no changes in the text are required.             |



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| United Kingdom   |                             | <p>at 0.3 m from bore centre. In fact, gradient output limits for MRI scanners are usually set not on the basis of a simplistic numerical limit but based on PNS thresholds determined using volunteer exposures (see IEC 60601-2-33 ed3: 2010). The threshold for PNS onset is multifactorial, and this approach ensures that the maximum gradient performance can be obtained consistent with patient and worker protection. Similarly p41 line 14-15 notes that ICNIRP limits can be exceeded in MRI. It must be borne in mind that ICNIRP generally employs safety factors when setting exposure limits, so that exposure to well-characterised EMF some way above the exposure limits is possible before effects are encountered. This is the situation in MRI, where safety is assured through adherence to the IEC standard.</p> |   |
| 59. Lyrae Velma,<br>,VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.3.3. Medical applications | <p>P.37 10 assessments can be measured with EMG (electromyography) to assess impact on the nerves to reveal whether start up burst brings on action potentials/depolarisation. Each person will have to be individually measured for induced currents as advised by IEEE Fact Sheet November 2010, which states the basic restrictions are based on induced internal electric fields, instead of induced current density as it is the physical quantity that determines the biological effect. P37 33 as transmembrane ionic activity has been identified as an influencing agent it would be pertinent to record this in the opinion as one of the</p>   | The SCENIHR considers that no changes in the text are required. |

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|   |                              | <p>multi-mechanisms of action</p> <p>P.39 22 as TMS has been identified as causing depolarisation of neurons &amp;/or modulate cortical excitability and 33 induced current it would be pertinent to record these in the opinion as one of the multi-mechanisms of action. P.40 25 the limiting factor stated as "about 50 T/s" should now comply with the IEEE regulations of Fact sheet 2010 whereby individual's own baseline nervous system levels should be taken into account for induced currents.</p> |   |
| 60. Souques Martine, EDF, martine.souques@edf.fr, France    | 3.3.3. Medical applications  | Page 38 lines 35-39: the cardiac implants (pacemakers and ICDs) have been omitted.  | The SCENIHR agrees with this comment and the text has been changed accordingly. |
| 61. Brooker Ian, Tyco, ibrooker@tycoint.com, United Kingdom | 3.3.4. Security applications | Section 3.3.4, Page 41, Lines 38-40 It is important to be clear; these are field measurements. Please change the text to read: "Both values were above the reference levels from the ICNIRP (1998) guidelines for the general public"   | The SCENIHR agrees with this comment and the text has been changed accordingly. |
| 62. Brooker Ian, Tyco, ibrooker@tycoint.com, United Kingdom | 3.3.4. Security applications | Section 3.3.4, Page 41, Lines 41-42 It is important to be clear; these are field measurements. Please change the text to read: "the maximum values were up to 13, 8 and 1.8 times higher than the reference levels from the ICNIRP guidelines (1998; 2004)"   | The SCENIHR agrees with this comment and the text has been changed accordingly. |
| 63. Ireland   | 3.3.5. Power and generation  | In this case, to study EMF is of only minor relevance. The serious effect on Human Health and on Farm Animals stems from the result of  | The comment refers to a hypothetical mechanism. No changes in the text are      |

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|   | transmission                             | exposure to positive ionisation of pollutant particles from power lines causing lung cancer. Professor Denis Henshaw of Bristol University assesses the effects from positive ionisation within Britain as 600 to 700 additional cases of lung cancer per annum.   | required.   |
| 64. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National Program Committee on NIR Protection), michelisaer@abv.bg, Bulgaria | 3.3.5. Power generation and transmission | The data could be added to 3.3.5. Power generation and transmission. After line 8 on p.43 Data of measurements of EF and MF inside transformer stations concerning EMF exposures to workplaces inside the premises are as follows: depending on the type of equipment from 3.37 $\mu\text{T}$ to 13.96 $\mu\text{T}$ and 20.89 V/m and 85.22 V/m for electric field strength. The measured values are below the ICNIRP guidelines (2010) and they do not create risk for the workers. Furthermore, their work duration is short. | The study suggested does not fulfil the inclusion criteria.                                 |
| 65. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National Program Committee on NIR Protection), michelisaer@abv.bg, Bulgaria | 3.3.5. Power generation and transmission | The data could be added to 3.3.5. Power generation and transmission. After line 4 on p.43 In Bulgaria (Zaryabova, et al, 2013), the average magnetic field measured on height 0.5 m, in 23 apartments that have rooms directly above and next to the transformers ("exposed apartments") was 0.37 $\mu\text{T}$ . In "unexposed" apartments (in the same building) the average values was 0.24 $\mu\text{T}$ (at the same floor) and 0.03 $\mu\text{T}$ (at higher floors).  | The literature cut-off date was extended and the additional literature has been considered. |
| 66. Israel Michel, National Center of Public Health and Analyses, Ministry of Health (Bulgarian National  | 3.3.5. Power generation and transmission | Study of different physical factors emitted by wind power sources has been performed in 2009 in Bulgaria. Electric and magnetic fields emitted by wind generators are with very low levels. Electric   | A paragraph on wind turbines has been included in the Opinion.                              |

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| <p>Program Committee on NIR Protection),<br/>michelisrael@abv.bg,<br/>Bulgaria</p>   |   | <p>field strengths do not exceed 2 V/m. Such levels are much below the values in homes. Magnetic flux densities are up to 0.02 <math>\mu</math>T, also very low. Higher values can be found close to the power lines connected to transmission of electricity from the generator.</p>  |   |
| <p>67. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p>   | <p>3.3.5. Power generation and transmission</p> | <p>P.42 48 three-fold increases in mean values have been found in apartments which are set on the floor above a transformer which could indicate a higher emf in living conditions of an elevated level which would be useful to bring into assessment criteria.</p>   | <p>The SCENIHR considers that no changes in the text are required.</p>  |
| <p>68. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p>   | <p>3.3.5. Power generation and transmission</p> | <p>P.43 8 measurements in ranges used here will have greater benefit than mean averaging which may conceal crucial hidden variables.</p>   | <p>The SCENIHR considers that no changes in the text are required.</p>  |
| <p>69. Beetlestone Mike, Society Of Motor Manufacturers and Traders (SMMT),<br/>mbeetles@jaguarlandrover.com,<br/>United Kingdom</p> | <p>3.3.6. Transportation</p>                    | <p>Following a discussion by the SMMT Electromagnetic Compatibility Working Group on 16 April 2014 the following comments were agreed:<br/>Line 43. The paper by Tell reports measurements of eight H/EV and six conventional vehicles, from which it was concluded that the EV magnetic fields were consistently greater than those measured in conventional vehicles, that the magnetic fields measured in all vehicles were less than 1% of ICNIRP 2010 reference levels, and that the EV magnetic fields were comparable to exposures residential environments. However, the magnetic sensors used (EMDEX LITE) have a limited bandwidth (40-1000 Hz) and could therefore miss</p> | <p>The numbers stated in the Opinion are cited in the "RESULTS AND DISCUSSION" paper of Tell et al (2013). They are not compared to residential exposure. The rest of data mentioned in the comment are anecdotal and cannot be included in the report.<br/><br/>No changes in the text are required.</p> |

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|  |                                  | <p>some frequency components. In addition, the results were sampled at only 4 s intervals and were spatially averaged over a number of measurement points. In practice, however, in-vehicle magnetic fields exhibit significant spatial (&gt;100 uT/m) and temporal (&gt;100 uT/s) gradients. Moreover, no spectral content was determined from these measurements, and so exposure assessments taking account of the frequency components were not obtained. The comparison with residential exposures, which are likely to be dominated by power frequencies, is therefore questionable. There are similar issues with some of the other work that is referenced as well. In-vehicle measurements up to 2.5 kHz from a small (10 kW) EV that has been analyzed indicate levels below 1% of the reference levels at each frequency, but for EMF these frequencies are not considered independently as they are for EMC. For EMF their value relative to the reference levels must not exceed 100% when added. In this case the spectral content added up to give a worst case (over time) of nearly 20% exposure when the amplitude and phase of the frequency components are taken into account (using the "weighted peak" approach.</p> |   |
| <p>70. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p> | <p>3.3.6.<br/>Transportation</p> | <p>P 43 17 Opinion of much lower values could be confusing as additional readings were much higher.<br/>Facts state field values reaching several tens of uT.</p>  | <p>This has been already considered; no changes in the text are required.</p> |

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| <p>71. Souques Martine, EDF,<br/>martine.souques@edf.fr,<br/>France</p>                           | <p>3.3.6.<br/>Transportation</p>   | <p>This section mixes together occupational exposure and the exposure of the general public. In principle, the SCENIHR report will be used to review — or not review — the 1999 European recommendation. Moreover, section 3.3.5 began with 'public concerns'. The first paragraph of this section clearly concerns occupational exposure and therefore has no purpose here. In the second paragraph, the type of exposure is not specified (Contessa 2010). In fact, it concerns drivers and therefore has no purpose here (note: this paragraph is a pure and simple copy of a part of the abstract, and not a critical analysis of the study). The other paragraphs do relate to exposure of the public.</p>   | <p>This is an informative comment, no changes in the text are required.</p> |
| <p>72. BILLERET Dominique, Toy Industries of Europe,<br/>dominique.billeret@tietoy.orgBelgium</p> | <p>3.3.7. Household appliances</p> | <p>- It is incorrect to state that individual exposure assessments would need to be carried out due to the range of frequencies and output powers used. Toy radio control units are permitted to operate in the EU in the frequency band allocated to general purpose low power radio control devices (49.82MHz to 49.98MHz). Additionally this band has a maximum effective radiated power of 10mW from the antenna. It would be a simple process to estimate exposure using this limit value.<br/>- Other radio control frequencies used in models (rather than toys) are also in designated bands (27MHz, 35MHz, 41MHz). These bands have an ERP maximum of 100mW. This type of equipment is aimed at the modeller and would likely fall outside of the scope of toys as defined by the TSD.</p> | <p>The text has been changed for the sake of clarity.</p>                   |

- In terms of health risk, all of the above frequencies are defined in the electromagnetic spectrum as RF (radio frequency). The conclusion of the SCENIHR is that the weight of evidence shows conclusively that there is no adverse health effect when exposed to these frequencies at power levels that do not induce thermal effects.

- The toy example that the opinion uses (plasma balls) generates EMF at intermediate frequencies (IF) which are in the range of 300Hz to 100kHz. Health effects have been identified related to IF exposure. However the single example cited of a toy that emits the "highest electric field" is not indicative of the toy market and in fact is most likely not classified as a toy at all but a product. TIE questions if the example taken complies with the horizontal standards.

- TIE questions that toys are offering any more exposure than any other product on the market. Typically toys emit very little EMF. The time spent by children playing with toys is very small compared to the general population's use of and exposure to products emitting EMF. Therefore toys probably represent an insignificant amount of overall exposure.

In conclusion, TIE welcomes the investigations into the public's increasing exposure to EMF, but strongly refutes the assumption that certain toys emit the highest electric fields found in our living environment, and the recommended reference levels for the general public are exceeded. TIE also

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|  |                                      | questions the example taken by the opinion, which may not be considered to be a toy. In case such toys are found, the report should made clear that these are exceptional cases and these toys are maybe not complying with the existing strict requirements.  |   |
| 73. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk, United Kingdom | 3.3.7. Household appliances          | P44 13 Opinion doesn't specify how many microwaves leaked when creating a mean value or whether one 10 year-old machine took up most of the mean average which is a shortcoming in assessments using mean averaging.   | Leakage was addressed; no changes in the text are required.                                 |
| 74. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk, United Kingdom | 3.3.9. Discussion on exposure to EMF | P47 21 for assessment purposes it would be relevant to measure harmonics in a test exposure setting along with the usual emf & radiowave levels within the test environment.   | The SCENIHR considers that no changes in the text are required.                             |
| 75. Rowley Jack, GSMA,<br>jrowley@gsma.com, United Kingdom   | 3.3.9. Discussion on exposure to EMF | 3.3.9. Discussion on exposure to EMF p. 48, line 11. It may also be interesting to note the following papers in respect of exposures from macrocell and small cell technology:<br><ul style="list-style-type: none"> <li>• A Comparison of RF Exposure in Macro- and Femtocells, Zarikoff et al., Health Physics, 105(1):39-48, July 2013.</li> <li>• Assessment and comparison of total RF-EMF exposure in femtocell and macrocell base station scenarios, Aerts et al., Radiation Protection Dosimetry, Published online: October 31, 2013.</li> <li>• Prediction and comparison of downlink electric-field and uplink localised SAR values for realistic indoor wireless planning, Plets et al., Radiation</li> </ul> | The literature cut-off date was extended and the additional literature has been considered. |





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|  |                                      | Protection Dosimetry, Published online: February 18, 2014   |  |
| 76. Souques Martine, EDF, martine.souques@edf.fr, France | 3.3.9. Discussion on exposure to EMF | <p>There are often small paragraphs that appear in a mass of information in the discussion, but which are copied directly into the Executive summary, where they appear much more important. One example concerns DC high-voltage overhead transmission lines, which are mentioned only in the discussion of exposure, with no quantitative data reported. With respect to exposure, contrary to what is stated on page 11, lines 8-9, and page 47 line 4, DC lines do not add much at all to environmental exposure since the background level of the static magnetic field (terrestrial field) is 50 to 60 <math>\mu\text{T}</math> in Europe page 47 line 10 With respect to power transformers in residential buildings, exposure can exceed several tenths of <math>\mu\text{T}</math>, but we must bear in mind that this exposure is very localized, associated with LV cables and does not concern the entire adjoining apartment. We lack data about 24-48-h personal exposure in these apartments</p> <p>page 47 line 20 : this is confusing. The 50 Hz current is not a resource (like a cake) which would be shared among the loads. Some perturbing loads consume more 50 Hz than 150 Hz current.</p> <p>p 47 line 13: modern electronics uses still</p> | The comments have been considered and where necessary the text has been changed. |

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|  |                                | <p>transformers because of galvanic insulation. They are smaller because they work at higher frequencies</p> <p>p 47 line 16 modern welding machines do not use thyristors anymore (old technology) but IGBT transistors. Welding machines are using more and more a power factor correction which allows to rectify the shape of the current. It is closer to a sinusoid, so there are less harmonics, and more HF perturbations. p 47 line 23: It should be clearly stated that stray currents are not the same in all countries. They depend of the neutral point treatment. In most European countries, as in France, the currents are circulating into the neutral, and not into the earth, and so there are no stray currents.</p> <p>page 47 line 24 "it has also been recently demonstrated..." A reference is missing here. This is about material with programmed obsolescence (low cost). The questions that should be discussed are:</p> <ul style="list-style-type: none"> <li>- how many hours will this material work when it is in this state?</li> <li>- what is the increase in the level of current harmonics in this state?</li> </ul> <p>And so, is it relevant for exposure considerations?</p> |  |
| <p>77. Pophof Blanka, BfS,<br/>bpophof@bfs.de,<br/>Germany</p> | <p>3.4.2. In vitro studies</p> | <p>Section "Human cell types"<br/>Titova et al. (2013) investigated the influence of intense Terahertz pulses on an artificial model of human skin. They found increased number of H2AX foci, indicating a possible DNA damage.</p>   | <p>The literature cut-off date was extended and the additional literature has been considered.</p> |

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| 78. United Kingdom   | 3.4.3 Discussion on health effects from THz fields | P56 6 as van der Waals interactions through non-linear resonance has been identified as a mechanism of homeostatis (flow of free energy through coherent excited state maintained by metabolism) it is reasonable to conclude that any interference of this process will cause imbalance. Therefore interference by vibration/resonance and excitation should be considered as a mechanism by means of disruption/interference not just for THz but for all EMFs, radio, microwave fields as the van de Waals interaction through non-linear resonance is a constant.   | The SCENIHR considers that no changes in the text are required.  |
| 79. Anderson Vitas, Two Fields Consulting, vitas.anderson@gmail.com, Australia | 3.5. Health effects from RF fields                 | As a body concerned with health risk assessment, I encourage the SCENIHR to consider a fresh review of the actual risks associated with established mechanisms for harm from RF exposures (heating, electrostimulation, shocks, burns, high energy pulse effects). In particular, I recommend a systematic investigation of reputable national/regional/organisational accident reports and registers to compile a statistical picture of the occurrence of RF related injuries, and under what circumstances they occurred. Such data would be invaluable for policy makers and RF safety standards bodies in prioritizing and setting RF safety measures. Misunderstanding of relative risk levels can lead to inappropriate safety control strategies. For example, the possibility of an adverse whole body heating response (disorientation, heat exhaustion, heat stroke) from RF exposures has become a central motivation for | Compilation of statistical register concerning RF related injuries is outside the scope of the Opinion, no changes in the text are required. |

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|  |  | <p>almost all RF safety standards and guidelines. However, in the intervening 60 or so years since this was originally posed as major potential risk, the literature seems to indicate very little, if any evidence of significant harm actually caused by this mechanism in public and occupational settings. Nonetheless, the WBA SAR basic restriction and particularly the E &amp; H reference levels derived from it form a major, and quite probably misguided, basis for setting protective RF exposure levels. In contrast there are some, albeit fairly limited reports of adverse localised RF heating effects, and more commonly RF shocks and burns which should receive greater attention, but don't. This pattern of injuries accords with the engineering realities of RF exposure whereby high exposures almost invariably only occur quite close to powerful RF sources, with highly localised near field exposures and not the unrealistic uniform plane wave conditions assumed for adverse whole body heating outcomes. If E &amp; H reference levels were alternatively formulated for protection against the more credible possibility of localised RF heating effects, it would not only provide better and more meaningful protection but may also obviate the need for many of the complex localised SAR assessments currently performed, thereby simplifying and improving accessibility for compliance assessments. However, such change is unlikely while relative risk levels for adverse RF effects remain so poorly understood.</p> |  |
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| <p>80. E A,<br/>ahealthyenvironment@gmail.com, United States</p>                             | <p>3.5. Health effects from RF fields</p> | <p>Scientific research should show what about electro sensitivity?<br/>I am electro-sensitive and I feel completely compromised that my symptoms are dismissed because nobody has made a experiment to prove it. I'm electrical engineer with degree, training and experience. You don't need to "scientific study" for me to know it is real. The RF levels are too high. More and more people will become effected as I am. Mothers and children will be first.</p> | <p>This comment is outside the scope of the public consultation. The SCENIHR does not dismiss the symptoms of people with IEI-EMF. However, the point is to identify what causes the symptoms. The opinion summarises the results of these tests.<br/><br/>No changes in the text are required.</p> |
| <p>81. Jenaer Eric, teslabel, eric.jenaer@skynet.be, Belgium</p>                             | <p>3.5. Health effects from RF fields</p> | <p>page 13, lignes 19 à 33<br/><br/>scenhir.txt</p>  | <p>The submission suggests that there are several methodological flaws with provocation studies for people with IEI-EMF. A new paragraph has been added to the relevant section, to discuss methodological issues.<br/>Text has been changed for the sake of clarity.</p>                           |
| <p>82. Milligan Michael, Mobile Manufacturers Forum, michael.milligan@mmfai.org, Belgium</p> | <p>3.5. Health effects from RF fields</p> | <p>Various see attached.<br/><br/>MMF_SCENIHR_Comments_PreliminaryOpi</p>   | <p>The literature cut-off date has been extended and the additional literature has been considered.</p>   |
| <p>83. Silk Anne, Silk Research Trust, annesilk@waitrose.com, United Kingdom</p>             | <p>3.5. Health effects from RF fields</p> | <p>DECT BASE STATION TRANSMITS PERMANENTLY, EVEN WHEN NO CALL IS IN PROGRESS. DECT cordless phones emit pulsed radiation – 2.4GHz – 5.8 GHz, with the pulse rate modulated at 100Hz. Pulse patterns can vary. The base station should be kept as far away as possible from places where people spend lengthy periods of time, e.g. beds,</p>  | <p>The data provided are anecdotal and do not meet the scientific criteria for inclusion. No changes in the text are required.</p>  |

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|   |                                    | <p>armchairs, work desks. Sleep can be affected. The human body is a broadband isotropic (omnidirectional antenna). Eddy currents will be generated in the brain.</p> <p>There are some cordless phones on the market based on CT+1 standard – it only transmits during a call. Applications include residential, PSTN, ISDN, GSM, CTM, voice, fax and modem. Average power is 10mW, peak power 250mW. The DECT range of signal is 300 meters.</p> <p>22 Cases have been known to the writer sent to Professor Samaras as an attachment today.</p> |  |
| 84. Silk Anne, Silk Research Trust,<br>annesilk@waitrose.com,<br>United Kingdom | 3.5. Health effects from RF fields | Attached are three more papers - More to follow.   | The data provided are anecdotal and do not meet the scientific criteria for inclusion. No changes in the text are required.        |
| 85. Silk Anne, Silk Research Trust,<br>annesilk@waitrose.com,<br>United Kingdom | 3.5. Health effects from RF fields | The papers sent today refer to the unusual clusters of Leukaemia cases on the River Elbe. These are to be added to the papers sent last week on the same subject. In addition I have been working on the further eight German clusters and their proximity to airports and transmitters. Do you require case by case information and satellite imagery together with case numbers, population, airport data, distance from airport?  | The data provided are anecdotal and do not meet the scientific criteria for inclusion.<br><br>No changes in the text are required. |
| 86. Silk Anne, Silk Research Trust,<br>annesilk@waitrose.com,<br>United Kingdom | 3.5. Health effects from RF fields | The sudden emergence of Multiple Sclerosis, Parkinsons disease and other rare diseases in the Faroe Islands appears to relate in time to Operation Valentine in 1940 and the powerful radar installations, with more recently much   | The SCENIHR considers that no changes in the text are required.  |

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| <p>87. Jelinek Lukas, National Institute of Public Health, elmag@szu.cz, Czech Republic</p> | <p>3.5.1. Neoplastic diseases</p> | <p>overflying by helicopters.</p> <p>Explanation:<br/> All the section mostly aims at studies looking for possible carcinogenic effect. It is however generally ignored that theoretical papers [1-3] had shown years ago that EMF (<math>f \leq 300</math> GHz) with intensity below the International exposure guidelines (e.g. ICNIRP 1998) cannot be expected to cause cancer or similar diseases. In fact, the continuing failure of epidemiological studies to find arguments for health impairment by long term exposure has only confirmed the rightness of the theory.</p> <p>[1] K. R. Foster, "Thermal and Nonthermal Mechanisms of Interaction of Radio-Frequency Energy with Biological Systems", IEEE Transaction on Plasma Science 28, pp. 15-22, (2000).<br/> [2] R. K. Adair, "Biophysical Limitson Athermal Effects of RF and Microwave Radiation", Bioelectromagnetics 24, pp. 39-48, (2003).<br/> [3] P. A. Valberg, T. E. van Deventer and M H. Repacholi, "Workgroup Report: Base Stations and Wireless Networks—Radiofrequency (RF) Exposures and Health Consequences", Environmental Health Perspectives 115, pp. 416-424 (2007). Amendment to the Opinion: The beginning of the section 3.5.1. should contain a subsection "What was already known on this subject?". There it should be clearly stated that theoretical works on possible mechanisms (and very importantly "impossible" mechanisms) had</p> | <p>A section on mechanisms has been included in the opinion.</p> |
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|   |                                  | shown years ago that RF fields with intensity below the International exposure guidelines (e.g. ICNIRP 1998) cannot be expected to cause neoplastic diseases. It should be also stated that the current state of knowledge about EMF interaction with condensed matter is so advanced that a mistake in experimental studies is much more probable than a discovery.  |   |
| 88. Souques Martine, French RadioProtection Society (SFRP) - Non Ionizing Radiation Section, section.rni.sfrp@gmail.com, France | 3.5.1. Neoplastic diseases       | Page 57, line 41-48: Seems to have a typo error: 2 W is for the 900 MHz band and 1 W is for the 1800 MHz band. The average output power is good (twice for the GSM 900 than the GSM 1800).  | The document has been changed accordingly.  |
| 89. United Kingdom  | 3.5.1.1. Epidemiological studies | <p>P57 33 Exposure assessment knowing can only begin to be reached by postulating on theories of possibilities as acknowledged in the opening introduction but in addition to considering the biological organism may require a paradigm shift to include the electromagnetic nature of the human.</p> <p>P57 38 Opinion – how to combine the use of variables, it logical to base exposure assessment levels on measurements which do not interfere with the human system which therefore would exclude the range of frequencies emanating from the human electromagnetic field as identified by WHO &amp; which can be objectively measured with measuring device using MANOVA (IEEE Student Conference on Research &amp; Development 2011); on assessments which</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>The wording in the text has been changed to clarify that exposure assessment in epidemiological studies is a challenge.</p> |



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|  |  | <p>exclude the frequency &amp; voltage range of peripheral nerve levels (EMG) to avoid nerve excitation/overstimulation; on measurements which exclude the range of cardiac frequency waves &amp; voltage measurements (ECG) to avoid ferromagnetic overstimulation; on brain assessments which exclude the range of brainwave frequencies &amp; voltage measurements (EEG) so that there is not interference with transmissions. Assessments can be calculated using the interval between baseline and action potentials in nerves which will inform the heart calculation rate by using measurements which are relative to the nerve (Reilly). The harmonic overtones produced from multiple sources can be assessed from real life situations by objective EMF harmonic measuring tools. As noted in previous IEEE citations there are "windows" of frequencies and "windows" of voltages. These will be the windows that the human system utilises for the electromagnetic system.</p> <p>P58 9 Whilst joules per kilogram is used as measurement of the body's ability to absorb one SAR process, it misses the empirical nature of the human system which acts as a collective entity for processing sensations rather than being able to split into fractions (kilogram parts) &amp; therefore one system has to process simultaneous energy joule transmissions at sites all over the brain and body which is not considered in assessment.</p> <p>P63 9 With the statements that there is no rise in</p> | <p>The SCENIHR does not agree. No change in the text is required.</p> <p>The comment was taken into account</p> |
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|   |                                  | rates of glioma & meningioma it can only be said that this evidence shows there is no risk (in rates of glioma & meningioma) related to common use of mobile phones not no risk per se, as is the opinion given.  | and the text was changed for the sake of clarity.  |
| 90. Cardis Elisabeth, CREAL, ecardis@creal.cat, Spain     | 3.5.1.1. Epidemiological studies | I have not been able to read the report in any detail, but did check the way in which one of our studies has been presented. In section 3.5.1.1, p. 60, lines 27-34 and 40-44, there is no mention that in Cardis et al (2011), two approaches have been used - the TCSE as described, but also an approach that, like that used by Lakhola et al, was not subject to laterality recall bias as laterality was not taken into account: "A complementary analysis in which 44 glioma and 135 meningioma cases in the most exposed area of the brain were compared with gliomas and meningiomas located elsewhere in the brain showed increased ORs for tumours in the most exposed part of the brain in those with 10+ years of mobile phone use (OR 2.80, 95% CI 1.13 to 6.94 for glioma)". These results are important as the definition of "most exposed area" is based on a more refined definition of exposure than that of Lakhola et al. Note also that in their case-specular analyses Lakhola et al also found an increased OR (2.00, 95%CI 0.68, 5.85) among long term users (10 years or more) based on small numbers of cases. | The comment was taken into account and the text was changed accordingly.                           |
| 91. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom | 3.5.1.1. Epidemiological         | Acoustic neuroma P64 3 We can observe this trail from the eight cranial nerve (acoustic & vestibular) to the inner ear (Eustian tube) which involves  | This is a personal view not supported by scientific evidence. No changes in the text are required. |

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|   | studies                          | <p>pressure sensors on the hairs to give clues about mechanisms which EHS experience, added to previous mechanisms of excitation, overstimulation and resonance.</p> <p>25 Contrary to the concluded opinion, evidence could in fact point towards a possible tumour site occurring at a distance of approx. 4-5 inches from the mobile phone antenna.</p> <p>40 opinion states a proviso that there was only 10 cases implying that this is not valid, but this is deemed a sufficient number of people as used to establish SAR model values.</p> <p>41 It is stated that there was no increased trend of acoustic neuroma, this is different from an increased risk of acoustic neuroma, as the trend of increased risk may have stayed the same by still being an increased risk of the same velocity. Therefore the secondary opinion that this suggests previous increased risks may be a chance finding is completely invalid as a hypothesis.</p> | <p>This is a personal view not supported by scientific evidence. No change in the text is required.</p> <p>The statement just provides the number of cases and makes no implications regarding validity. No change in the text is required.</p> <p>The SCENIHR disagrees. The increase in relative risk can be translated into an expected absolute number of excess cases, when the magnitude of relative risk is known as well as the population exposure prevalence. No change in the text is required.</p> |
| 92. Pophof Blanka, BfS, bpophof@bfs.de, Germany | 3.5.1.1. Epidemiological studies | <p>The Health Council of Netherland published recently a comprehensive review on the epidemiology of tumours in the head. It contains a quantitative scoring of study quality and a detailed comparison of the Hardell and INTERPHONE studies. Possibly, it could be helpful for the discussion.</p> <p><a href="http://www.gezondheidsraad.nl/en/publications/environmental-health/mobile-phones-and-cancer-part-1-epidemiology-tumours-head">http://www.gezondheidsraad.nl/en/publications/environmental-health/mobile-phones-and-cancer-part-1-epidemiology-tumours-head</a></p>   | <p>It was decided not to use quantitative scoring of publications in this Opinion, because of the lack of a generally accepted scoring system. The preferred approach was to discuss the weaknesses and strengths of publications. No change in the text is required.</p>  |
| 93. Rowley Jack, GSM                            | 3.5.1.1.                         | 3.5.1.1. Epidemiological studies p. 60, line 6-18.  | The literature cut-off date was extended   |

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| <p>Association,<br/>jrowley@gsma.com,<br/>United Kingdom</p>           | <p>Epidemiological studies</p>          | <p>These recent publications provide further insight into interpretation of case-control studies of mobile phone use and acoustic neuroma risk:</p> <ul style="list-style-type: none"> <li>• Long-term Mobile Phone Use and Acoustic Neuroma Risk, Pettersson et al., Epidemiology, Published online: 15 January 2014.</li> <li>• Measuring Mobile Phone Use: Self-Report Versus Log Data, Boase et al., Journal of Computer-Mediated Communication, 18(4):508-519, July 2013</li> </ul> <p>3.5.1.1. Epidemiological studies p. 65, lines 45-49. This recent publication further explores the consistency of epidemiological studies of mobile phone use and the risk of intracranial tumors:</p> <ul style="list-style-type: none"> <li>• Mobile phone use and risk of intracranial tumors: A consistency analysis, Lagorio et al., Bioelectromagnetics, 35(2):79-90, February 2014.</li> </ul> <p>3.5.1.1. Epidemiological studies p. 67, line 45-46. The conclusion in respect of epidemiological studies of cancer risks from base stations and broadcast antennas may be overlooked except for very careful readers.</p> | <p>and the additional literature has been considered.</p> <p>It was decided to consider primarily original papers for the opinion. This has been made clearer in the text in the section "3.2. Methodology".</p> <p>The comment has been taken into account in the final Opinion.</p> |
| <p>94. Rowley Jack, GSMA,<br/>jrowley@gsma.com,<br/>United Kingdom</p> | <p>3.5.1.1. Epidemiological studies</p> | <p>3.5.1.1. Epidemiological studies p. 58, line 15. In support of the statement that in respect of RF exposures there is a '...lack of verification of any proposed non-thermal interaction mechanism...' GSMA recommends that SCENIHR consider the following studies supported within the scope of the UK Mobile Telecommunications and Health Research (MTHR) programme:</p>  | <p>A section on mechanisms has been included.</p>   |

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|  |  | <ul style="list-style-type: none"><li>• A doubly resonant cavity for detection of RF demodulation by living cells, Balzano et al., Bioelectromagnetics, 29(2):81-91, February 2008.</li><li>• Exposure to GSM RF Fields Does Not Affect Calcium Homeostasis in Human Endothelial Cells, Rat Pheocromocytoma Cells or Rat Hippocampal Neurons, O'Connor et al., PLoS ONE, 5(7):e11828, Published: July 27, 2010.</li><li>• Absence of nonlinear responses in cells and tissues exposed to RF energy at mobile phone frequencies using a doubly resonant cavity, Kowalczyk et al., Bioelectromagnetics, 31(7):556-565, Oct 2010.</li></ul> <p>We note that the Report 2012 of the MTHR programme published in February 2014 concludes (p. 14) on the basis of studies supported by the programme:</p> <p>'Taken together, we believe that the results from these eight studies constitute a substantial body of evidence that modulation does not play a significant role in the interaction of RF fields with biological systems. This conclusion has extremely important implications as it provides a reasonably high degree of confidence that the results obtained with a modulated signal characteristic of one communications system can be extrapolated to exposures from other systems operating at similar frequencies. This should facilitate the pooling of data from different studies and allow conclusions to be drawn with greater confidence.'</p> <p>The GSMA encourages the SCENIHR to consider</p> |  |
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|   |                                  | explicitly the MTHR supported studies of potential non-thermal and modulation specific mechanisms. The GSMA also encourages the SCENIHR to include a clear statement in the final EMF Opinion on the relevance of existing knowledge to understanding the potential health effects of newer RF technologies and modulations as this is relevant for future risk assessment actions.   |   |
| 95. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom | 3.5.1.1. Epidemiological studies | <p>3.5.1.1. Epidemiological studies p. 60, line 6-18. These recent publications provide further insight into interpretation of case-control studies of mobile phone use and acoustic neuroma risk:</p> <ul style="list-style-type: none"> <li>• Long-term Mobile Phone Use and Acoustic Neuroma Risk, Pettersson et al., Epidemiology, Published online: 15 January 2014.</li> <li>• Measuring Mobile Phone Use: Self-Report Versus Log Data, Boase et al., Journal of Computer-Mediated Communication, 18(4):508-519, July 2013.</li> </ul> <p>3.5.1.1. Epidemiological studies p. 65, lines 45-49. This recent publication further explores the consistency of epidemiological studies of mobile phone use and the risk of intracranial tumors:</p> <ul style="list-style-type: none"> <li>• Mobile phone use and risk of intracranial tumors: A consistency analysis, Lagorio et al., Bioelectromagnetics, 35(2):79-90, February 2014.</li> </ul> <p>3.5.1.1. Epidemiological studies p. 67, line 45-46. The conclusion in respect of epidemiological studies of cancer risks from base stations and</p> | <p>The literature cut-off date has been extended and the additional literature has been considered.</p> <p>The inclusion and exclusion criteria have been described in the opinion.</p> |

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|   |                          | broadcast antennas may be overlooked except for very careful readers.  |   |
| 96. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.5.1.2. In vivo studies | <p>P68 12 The opinion should read that no accepted evidence has been released if Independent Scientists have preferred evidence which has been refuted. Even so, no evidence produced should not logically mean that no evidence exists or invalidate a possibility of the effect or stand as evidence of non-existence because research has not yet shown it to be so.</p> <p>16 Opinion probably false positives has no substance to it whereupon it would be more beneficial to look into the differences that had been observed to learn more and to find patterns.</p> <p>17 Opinion that Overall RF are not carcinogenic in laboratory rodents is not in keeping with the pattern of research &amp; conclusions reported in this section.</p> <p>28 Human lifespan &amp; development cycles should be judged in ratio to the rat when assessing shortening of life as found here.</p> <p>43 Females shown to have separate effects as experienced with EHS persons where the majority are females. Assessments should divide male and female results which could reveal hidden patterns.</p> <p>P69 Observations at</p> <p>6 increased incidence of lung carcinomas.</p> <p>9 Significant effects on liver tumours.</p> <p>26 considerable impact on thermoregulation.</p> | The SCENIHR considers that no changes in the text are required. |

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|  |                                  | <p>34 significant increase in spontaneous pituitary tumours (not in male rats). Does not warrant the opinion that 43 the studies have not produced any compelling evidence of carcinogens or other adverse effects, especially when it goes on to say that it may 45 shorten lifespan and give an increased risk of lung tumours. Or P 70 3 mostly negative in outcome and that the studies show strong evidence for absence of effect. This is in complete contrast to the reports and further neglect to conclude the above observations were on female rats which could add weight to the need to classify male and female separately as well as a whole.</p>   |  |
| <p>97. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk, United Kingdom</p> | <p>3.5.1.3. In vitro studies</p> | <p>Of the studies' findings mentioned P70 48 Statistically significant increase with spindle alterations. P71 5 defects in spindle assembly. 7 increase in apoptotic cells 13 destruction of mitotic spindle. 35 increase in DNA migration 38 significant increase in DNA fragmentation &amp; ROS formation. P72 2 significant increase of foci formation. 5 statistically significant increase in ROS formation. 10 inhibition of endogenous foci formation. 13 inhibition of 53P1/γ-H2AX DNA repair foci. 39 statistically significant increase in DNA damage &amp; DNA migration. Opinion should find significance in the reported damage whilst instead opinion focusses on one paper which alleges contains disception.</p> <p>13 also shows that EHS persons had significant inhibition of 53P1/γ-H2AX DNA Repair foci</p> | <p>The text has been changed for the sake of clarity.</p> <p>The SCENIHR considers that no changes</p> |



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|                  |                   | <p>formation which could be used as a biomarker. Non genotoxic effects.</p> <p>P75 51 increase in apoptic cells. 53 but no effect for shorter periods reveals how test results might be skewed by revealing only up until a particular timeslot which is a valid observance for assessment testing.</p> <p>P77 32 mechanisms involving leakage of electrons from the mitochondria and the induction of oxidative stress could be worthy of considering as one of the multi-mechanisms.</p> <p>P78 20 The opinion that effects are cell-type specific is useful in finding patterns of effects.</p> <p>P79 3 - 6 ODC activity on human neuroblastoma cells confirms involvement of this enzyme which could be implicated in mechanism or lacking in EHS candidates.</p> <p>16 Authors state opposite results when introducing the next study but this is misleading as the next study is with a different frequency so cannot be viewed as opposing the previous test and would be misleading for assessment criteria.</p> <p>P80 7 identification of cellular stress markers could be added to the list of possible mechanisms</p> <p>P81 45 Opinion deems affect to have disappeared but it could have changed a compensatory action in the body or have caused a secondary function or even lie in wait, eg. With transcranial magnetic stimulation where impulses are remembered by the senses.</p> | <p>in the text are required.</p> <p>The SCENIHR does not agree. Shorter/longer periods refer to exposure duration (not to assay duration). No change in the text is required.</p> <p>This is a suggested hypothesis without scientific evidence. No changes in the text are required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> <p>The comment was taken into account and the text has been changed accordingly.</p> <p>This is a suggested hypothesis without scientific evidence. No changes in the text are required.</p> |
| 98. Lyrae Velma, | 3.5.1.3. In vitro | P83 6 opinion that the effect seemed to be cell  | The conclusion section is a summary of   |

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| <p>VelmaLyrae@hotmail.co.uk, United Kingdom</p>  | <p>studies</p>   | <p>specific infers that this is a surprise whereas it has been established in previous sections that this is the case.<br/> 11 the phraseology "most of the studies did not find any effects" could be misunderstood whereas it refers only to other cancer-related endpoints.<br/> 12 A few studies finding positive findings is not reflective of the research which shows categorically that there are DNA fragmentation, ROS formation, spindle alterations and increase in apoptosis cells (listed with ref. Above). Opinion that these are reversible relies on an environment of non-pulsed circumstances which, in the area of assessment is not a viable asset of the everyday environment. Further EHS persons have been shown to have inhibited 53P1/y-H2AX DNA Repair foci formation.</p> | <p>previous paragraphs. No change in the text is required.</p> <p>The comment was taken into account. The text was changed for the sake of clarity.</p> <p>The distinction between fixed and non-fixed DNA damage has been made clearer in the text.</p> |
| <p>99. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom</p>                               | <p>3.5.1.3. In vitro studies</p>                                 | <p>3.5.1.3. In vitro studies p. 70, lines 14-17. We note one additional study:<br/> • Genotoxic effects of exposure to radiofrequency electromagnetic fields (RF-EMF) in HL-60 cells are not reproducible, Speit et al., Mutation Research/Genetic Toxicology and Environmental Mutagenesis, Available online 28 June 2013.</p>   | <p>The literature cut-off date was extended and the additional literature has been considered.</p>   |
| <p>100. Jelinek Lukas, National Institute of Public Health, elmag@szu.cz, Czech Republic</p> | <p>3.5.1.4. Conclusions on neoplastic diseases from RF expos</p> | <p>Explanation:<br/> All the section mostly aims at studies looking for possible carcinogenic effect. It is however generally ignored that theoretical papers [1-3] had shown years ago that EMF (<math>f \leq 300</math> GHz) with intensity below the International exposure guidelines (e.g. ICNIRP 1998) cannot be expected</p>   | <p>A section on mechanisms has been included.</p>  |

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|   |  | <p>to cause cancer or similar diseases. In fact, the continuing failure of epidemiological studies to find arguments for health impairment by long term exposure has only confirmed the rightness of the theory.</p> <p>[1] K. R. Foster, "Thermal and Nonthermal Mechanisms of Interaction of Radio-Frequency Energy with Biological Systems", IEEE Transaction on Plasma Science 28, pp. 15-22, (2000)</p> <p>[2] R. K. Adair, "Biophysical Limitson Athermal Effects of RF and Microwave Radiation", Bioelectromagnetics 24, pp. 39-48, (2003).</p> <p>[3] P. A. Valberg, T. E. van Deventer and M H. Repacholi, "Workgroup Report: Base Stations and Wireless Networks—Radiofrequency (RF) Exposures and Health Consequences", Environmental Health Perspectives 115, pp. 416-424 (2007). Amendment to the Opinion: The section 3.5.1.4. should contain information that the continuing failure of epidemiological studies to find arguments for causal relationship of neoplastic diseases with the exposure to RF fields has confirmed the conclusions of theoretical works stating that such relationship for intensities below the International exposure guidelines (e.g. ICNIRP 1998) cannot be expected.</p> |   |
| <p>101. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom</p> | <p>3.5.1.4. Conclusions on neoplastic diseases from RF expos</p> | <p>3.5.1.4. Conclusions on neoplastic diseases from RF exposure p. 83, lines 15-17. We suggest that the language ‘...do not unequivocally indicate...’ may not be clear to non-scientists, especially non-native English speakers.</p>  | <p>The issue has been addressed in the Opinion.</p> |

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|  |  | We recommend that this phrase is amended to reflect the same meaning but without the double negative. We also suggest that it is expressed more directly in any version for the public of the final opinion that may be prepared for the European Commission.   |  |
| 102. Alessandro Clavenna,<br>alexclav@hotmail.com,<br>Italy  | 3.5.2. Nervous system effects and neurobehavioural disorders | Every time i make a 5 minutes Phone Call with my mobile phone I have headaches, dizziness and brain fog for two hours.  | The issue of whether EMF causes these symptoms is discussed in the Opinion. No changes in the text are required.                           |
| 103. Silk Anne, Silk Research Trust,<br>annesilk@waitrose.com,<br>United Kingdom   | 3.5.2. Nervous system effects and neurobehavioural disorders | This list of 42 Multiple System Atrophy patients most of whom I have met and interviewed shows the very high number who worked in electrical industries, airports and military. Also many spontaneously reported many electric shocks - not static micro-shocks. Chemical insult is also a factor. Electroporation is of high significance.   | The data provided are anecdotal and do not meet the scientific criteria for inclusion. No changes in the text are required.                |
| 104. Souques Martine,<br>French RadioProtection Society (SFRP) - Non Ionizing Radiation Section,<br>section.rni.sfrp@gmail.com, France | 3.5.2. Nervous system effects and neurobehavioural disorders | Page 84, ligne 14: SCENIHR<br>Page 99, ligne 47: reference Ghosn et al., 2012 missing (Radiat Res. 2012 Dec;178(6):543-50. doi: 10.1667/RR3007.1. Epub 2012 Oct 29)<br>Page 101, ligne 1: reference Loos et al., 2013 missing (Environ Sci Pollut Res Int. 2013 May;20(5):2735-46. doi: 10.1007/s11356-012-1266-5. Epub 2012 Nov 10)<br>Page 105, ligne 25: Physiological effects should be considered in view of looking at clarifying the symptoms expressed by hypersensitive people. Study of Pelletier et al. 2012 should be cited there (Environ Sci Pollut Res Int. 2013 May;20(5):2735- | The text of the Opinion has been corrected.<br>The literature cut-off date was extended and the additional literature has been considered. |

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|  |   | 46. doi: 10.1007/s11356-012-1266-5. Epub 2012 Nov 10)   |  |
| 105. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.5.2.1.<br>Epidemiological<br>studies    | P85 50 consideration is given to whether frequency of the signal is relevant a factor where science has shown our brains run in synchronicity to the Schumann Resonance which entrains our brain so that any interference on the frequency pathways of the Schumann frequency would logically interfere with brain waves. Frequency consideration could also be fundamental when assessing EHS persons  | This is a proposal for a hypothetical mechanism without scientific references provided. No change in the text is required.   |
| 106. Rowley Jack, GSMA,<br>jrowley@gsma.com,<br>United Kingdom   | 3.5.2.1.<br>Epidemiological<br>studies    | 3.5.2.1. Epidemiological studies p. 84, line 21. We note the following additional study:<br><ul style="list-style-type: none"> <li>• Mobile Phone Use, Blood Lead Levels, and Attention Deficit Hyperactivity Symptoms in Children: A Longitudinal Study, Byun et al., PLoS ONE, 8(3):e59742, Published: March 21, 2013.</li> </ul>   | The literature deadline was extended and the additional literature has been considered.  |
| 107. United Kingdom  | 3.5.2.2.<br>Neurophysiological<br>studies | P86 12 Opinion that findings are contradictory may be because EEG baseline frequencies and frequency of mobile signals have not been matched up or adjustments made for male/female.<br>13 Opinion that there is a need for further studies on mechanisms fail to consider melatonin pathways as reported by Professor Denis Henshaw.<br>20 Opinion that gliosis and neurodegeneration occurred at high levels but did not show effects at a lower level reveals another variable that could be | The comment refers to the previous SCENIHR Opinion. No change in the text is required.<br><br>The comment refers to the previous SCENIHR Opinion. No change in the text is required.<br><br>The comment refers to the previous SCENIHR Opinion. No change in the text is required. |

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|  |  | <p>open to being used to skewer the results. 31 states of resting and active brain can be further distinguished into left and right brain mode and even areas of the brain activated to give a clear pattern of events.</p> <p>P89 13 Authors underline considerable individual variability in EEGs which is a surprising statement, seemingly emphasising a known fact as if a new discovery i.e. that individuals have unique EEG frequency patterns. Further....</p> <p>P91 3 Females are more sensitive i.e. affected than males which is worthy of note for assessments.</p><br><p>14 effect in just one frequency band correlates with mobile signal frequency HPA cites at 8.34Hz</p> <p>P93<br/>7 findings of increased inter-hemispheric coherence of frontal alpha EEG could give value to testing of EHS persons</p> <p>Human studies waking EEG<br/>51 faster reaction times could alternatively be seen as a negative indication of a state of hyperactivity, hypervigilance rf emf effects &amp; erp</p> <p>P96</p> | <p>Since there are no studies addressing the left/right brain problem, no change in the text is required.</p> <p>The wording in the text has been changed to improve clarity.</p> <p>This is a comment without scientific references. However, it is mentioned in the opinion that we are lacking studies with subjects of different gender and age and related research is recommended. No change in the text is required.</p> <p>This is a comment without scientific support. No change is needed in the text.</p> <p>The issue of IEI-EMF has been addressed in depth in the opinion. No change in the text is required.</p> <p>This is a personal view. No change in the text is required.</p> |
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|                     |                                     | <p>10 Design study exemplifies separating male and female participants whereas if this had not been done opposite reactions in male to female would be reported as conflicting.</p> <p>33 impaired performance by sensitive group in exposure and additionally sham exposure is likely due to residual exposure leaving no time for recovery and further when sham is not shielded by other sources.</p> <p>RF effects and cognition<br/>p99</p> <p>16 Opinion that RF EMF exposure has no negative cognitive effects are not supported by the research which precedes it stating 12 reaction time significantly increased which shows a deviation from natural levels and could indicate hyperactivity, hypervigilance, inability to combine slower brainwave oscillations to process philosophical thought, ruminations etc. Human studies others</p> <p>P101 6 a key enzyme is implicated which could be considered as a possible mechanism along with other enzyme mentioned. This would also be considered as a mechanism in the sleep cycle.</p> | <p>The comment has been considered and the discussion of the section was amended accordingly.</p> <p>The issue of IEI-EMF has been discussed in depth in the Opinion. No change in the text is required.</p> <p>This is a personal view. No change in the text is required. Furthermore, this comment contradicts the previous one.</p> <p>This is a proposal for a hypothetical mechanism without scientific references provided. No change is needed in the text.</p> |
| 108. United Kingdom | 3.5.2.2. Neurophysiological studies | <p>Discussion on neurophysiological studies 36 the opinion that all the EEG Overall yielded variable results fails to differentiate between male and female opposite reactions noted in the research which would iron out some of the</p>  | <p>The comment has been considered and the discussion of the section was amended accordingly.</p>   |

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|   |                                     | <p>variables. Further it omits to mention that the uniqueness of individual brainwave graphs at baseline are not included in the studies which are essential for recognising patterns.</p> <p>51 Opinion states that it is not known whether emfs might affect CNS of elderly differently whereas EEG results (Vecchio et al page 93 -8) finds significant results as a feature of elderly subjects.</p> <p>P102 1 Opinion does not know whether females/ those with pre-existing medical conditions may be affected differently raises important questions on dismissing (majority) female EHS persons who may experience sensory effects on CNS as an explanation to sensing emfs and often have a pre-existing medical condition.</p> | <p>The comment is in line with the existing text. No change is required.</p> <p>The issue of IEI-EMF has been discussed in depth in the opinion. No change in the text is required.</p> |
| 109. Kännälä Sami, STUK - Radiation and Nuclear Safety Authority, sami.kannala@stuk.fi, Finland | 3.5.2.2. Neurophysiological studies | <p>Page 99, line 47: Studies on mobile phone exposure effects on cerebral blood flow and brain glucose metabolism (Kwon et al. 2011, Kwon et al. 2012) should be included in the review. In Kwon et al. 2011 the volunteers were first exposed and then scanned with a PET device. In Kwon et al. 2012 the exposure and PET scan were simultaneous. Both studies were double-blinded and the exposure levels were carefully assessed with numerical calculations</p> <p>References:<br/>Kwon MS, Vorobyev V, Kännälä S, Laine M, Rinne</p>   | The suggested literature has been considered. The text was changed accordingly.   |



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|  |  | <p>JO, Toivonen T, Johansson J, Teräs M, Lindholm H, Alanko T, Hämäläinen H. GSM mobile phone radiation suppresses brain glucose metabolism. <i>Journal of Cerebral Blood Flow &amp; Metabolism</i> 2011; 31: 2293–2301. DOI:10.1038/jcbfm.2011</p> <p>Kwon MS, Vorobyev V, Kännälä S, Laine M, Rinne JO, Toivonen T, Johansson J, Teräs M, Joutsa J, Tuominen L, Lindholm H, Alanko T, Hämäläinen H. No effects of short-term GSM mobile phone radiation on cerebral blood flow as measured by positron emission tomography. <i>Bioelectromagnetics</i> 2012; 33 (3): 247–256. DOI:10.1002/bem.20702</p> |  |
| 110. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.5.2.2.<br>Neurophysiological studies | <p>10 results are only inconsistent if all parameters are not taken into consideration, e.g. individual brainwave frequency patterns without the signal present so that a useful comparison can be made.</p> <p>13 Opinion that overall cognitive functions are not altered in humans might conceal hidden variables that cognitive functions are altered in females. M.I.T note effects on the right hemisphere of the brain most associated with the female brain. Yale note alterations in cognition, mood and behaviour. (file too large to submit according to upload here)</p>                      | The comment has been considered and the discussion of the section was amended accordingly. |
| 111. Pophof Blanka, BfS,<br>bpophof@bfs.de,<br>Germany           | 3.5.2.2.<br>Neurophysiological studies | <p>Page 96-97, section "Human studies - cognition"</p> <p>The study by Wallace et al, <i>Bioelectromagnetics</i>, 2012, should be mentioned in this section, as well as in Table 14. The parallel study on symptoms is mentioned in the "Symptoms" section. In the recent publication, no effects of TETRA on memory</p>  | The study has been considered.   |

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|  |                                     | and circulatory parameters were found.   |  |
| 112. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom   | 3.5.2.2. Neurophysiological studies | 3.5.2.2. Neurophysiological studies p. 86, line 29. We note the following additional study: <ul style="list-style-type: none"> <li>• Effects of electromagnetic fields emitted from W-CDMA-like mobile phones on sleep in humans, Nakatani-Enomoto et al., Bioelectromagnetics, 34(8):589–598, December 2013. p. 92, lines 2-3. We note the following study for inclusion in Table 12: <ul style="list-style-type: none"> <li>• The Alpha Band of the Resting Electroencephalogram under Pulsed and Continuous Radiofrequency Exposures, Perentos et al., IEEE Transactions on Biomedical Engineering, 60(6):1702 - 1710 June 2013.</li> </ul> </li> </ul> | The literature cut-off date was extended and the additional literature has been considered.      |
| 113. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom | 3.5.2.3. In vivo studies            | P.104<br>23 Opinion that the epileptic brain could be more sensitive to RF exposure could share indicators for EHS persons who may have epileptic characteristics such as spiking in EEG other effects.<br>P105 51 significantly increased ACTH and corticosterone levels could reveal a mechanism and characteristic in EHS persons.  | This is a suggested hypothesis without scientific evidence. No changes in the text are required. |
| 114. Pophof Blanka, BfS, bpophof@bfs.de, Germany           | 3.5.2.3. In vivo studies            | Section "Neurodegeneration", Page 104 - 105 Additionally to Arendash, Banaceur et al. (2012) found an improvement of cognitive functions (less anxiety) in Tg mice prone to AD under WiFi exposure.  | The study has been considered.   |
| 115. Rowley Jack, GSMA, jrowley@gsma.com,                  | 3.5.2.3. In vivo studies            | 3.5.2.3. In vivo studies<br>p. 103, line 24. A study Hirata et al, 2012 is   | This has been amended.   |

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| United Kingdom   |                           | mentioned but it does not appear in the Reference list.   |   |
| 116. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom                         | 3.5.2.4. In vitro studies | 50 oxidative stress could be a useful biomarker or mechanism for EHS persons P107 3 mechanism of oxygen radical production is suggested.<br>Conclusions on in vitro studies 20 Opinion fails to notice consistent effects shown by 2.45 Ghz and to link patterns according to particular frequency signals which impact upon the nerves as energy impulses.   | This is a suggested hypothesis without scientific evidence. No changes in the text are required.  |
| 117. Jelinek Lukas, National Institute of Public Health,<br>elmag@szu.cz, Czech Republic | 3.5.3. Symptoms           | Explanation:<br>The section focuses on the so-called "electromagnetic hypersensitivity" and concludes that there is lack of evidence showing a causal relationship to EMF, i.e. the section is showing what "electromagnetic hypersensitivity" is not. There are, however, publications that explain what "electromagnetic hypersensitivity" actually is. Among many, the most important is [1], where many reasons are given to denote "electromagnetic hypersensitivity" as psychosomatic disease. This statement was later repeatedly supported by experiments, e.g. [2] using fMRI and sham exposure. Following the scientific method, a hypothesis which hasn't been disproved has to be considered as valid. In this case, the hypothesis of the electromagnetic hypersensitivity being a psychosomatic disease has been further supported by many experiments. | The opinion is limited to reviewing the available literature relating to possible health effects of EMF. A detailed examination of possible alternative explanations for IEI-EMF is outside of the remit for this Opinion. No change in the text is required. |

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|  |                              | <p>[1] C. J. Gothe, C. Molin, C. G. Nilsson, "The environmental somatization syndrome", <i>Psychosomatics</i> 36, pp. 1-11, (1995).</p> <p>[2] M. Landgrebe, W. Barta, K. Rosengarth, U. Frick, S. Hauser, B. Langguth, R. Rutschmann, M. W. Greenlee, G. Hajak, P. Eichhammer, "Neuronal correlates of symptom formation in functional somatic syndromes: a fMRI study", <i>Neuroimage</i> 41, pp.1336-1344, (2008).</p> <p>Amendment to the Opinion: The subsection "What was already known on this subject?" in the section "3.5.3. Symptoms" must contain information that there exists a scientifically valid hypothesis that "electromagnetic hypersensitivity" or "electrosensitivity" is of psychogenic etiology. The subsection should also contain information that this hypothesis has never been disproved.</p> |  |
| 118. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.5.3. Symptoms              | P108 6 Opinion that there was no consistency with individual symptoms is likely as general public mixed in with EHS will not make EHS markers identifiable.   | The comment has been taken into account and the text of the discussion of the section ("3.6.3 Symptoms") has been amended.   |
| 119. United Kingdom  | 3.5.3.1. Provocation studies | <p>P108 53 As noted, residual effects occur after exposure so that it is not possible on a second round to be in a clear space to perceive the senses or the effects will be masked.</p> <p>P109 1. the Rimbach study is an important study for long-term exposure which is worthy of noting</p>  | <p>This comment has been taken into account and the text in the discussion of the section ("3.6.3 Symptoms") has been amended accordingly.</p> <p>The inclusion and exclusion criteria have been described in the opinion this study does not meet the quality criteria for inclusion in the opinion and cannot be</p> |

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|  |                              | <p>24 whilst three test subjects proved to be unreliable, the method of shielding to isolate effects of different frequencies is a viable way to test those EHS who have identified the frequency they are sensitised to along with being able to identify pattern of magnetic flux on nerves.</p> <p>41 the opinion that participants are not able to make discrimination and that holds true for people with IEI-EMF (EHS) is not a true statement to make per se as all EHS persons have not been tested. It is also misleading as EHS persons are able to discriminate if it is their particular signature frequency which they are sensitive to as William Rea identified in his extensive studies.</p> | <p>used for risk assessment.</p> <p>The SCENIHR considers that no changes in the text are required.</p> <p>The relevant line states "None of these studies has found any evidence that participants are able to make this discrimination, a result which holds true both for people with IEI-EMF and for those without it." This is an accurate summary of the studies that were reviewed. No change is required in the text.</p> |
| 120. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom | 3.5.3.1. Provocation studies | <p>3.5.3.1. Provocation studies p. 108, lines 23-43. We note an additional provocation study based on information as the exposure variable that may be relevant to interpretation of the other studies:</p> <ul style="list-style-type: none"> <li>• Are media warnings about the adverse health effects of modern life self-fulfilling? An experimental study on idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF), Witthöft et al., Journal of Psychosomatic Research, 74(3):206–212, March 2013.</li> </ul> <p>p. 110, line 1. We note the following additional</p>   | <p>This study does not test the effects of EMF on health and is therefore outside the remit of this opinion. No change in the text is required.</p> <p>The inclusion and exclusion criteria have</p>  |

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|  |                                       | <p>study for consideration:</p> <ul style="list-style-type: none"> <li>• Replication of heart rate variability provocation study with 2.4-GHz cordless phone confirms original findings, Havas et al., Electromagnetic Biology and Medicine, 32(2):253-266, June 2013.</li> </ul>   | <p>been described in the opinion. The study does not meet inclusion criteria.</p>  |
| <p>121. Weller Steven,<br/>steve_g_weller@hotmail.com, Australia</p> | <p>3.5.3.1. Provocation studies</p>   | <p>Pretty much the whole of section 3.5.3.1. is specious and without merit. The provocation tests being conducted today by scientists are based on flawed protocols. They are not biological tests, are very subjective and can be conducted/manipulated in such a way to give a null finding. Why these tests are not conducted with biological tests is unclear. I am EHS and have been able to clearly demonstrate through my own "provocation tests" what the cause is. We have professors who have degrees in psychology performing tests in a number of countries including Australia. They do not have a medical degree and neither do they have sufficient qualifications in non ionising radiation to be making claims about the validity of EHS. I have included a personal case study that I believe clearly demonstrates EHS is real, can be linked to EMR, is not linked to a "normal disease process" and is not a placebo effect. It is time we had responsible scientific tests performed that is free from industry interference and conflicts of interests.</p> | <p>This comment was taken into account and the text in the discussion of the section ("3.6.3 Symptoms") was amended accordingly.</p> |
| <p>122. United Kingdom</p>   | <p>3.5.3.2. Observational studies</p> | <p>P113 24 Opinion states the stress reported was caused by being easy to contact and not through exposure which cannot be substantiated. P113 37 the "nocebo" effect can only be</p>   | <p>The text has been changed for the sake of clarity.</p> <p>The relevant line in the opinion cites the</p>                          |

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|  |  | <p>substantiated when scientific objective testing has been ruled out. It would also mean the opposite is true in that whilst being irradiated the candidate could suspend symptoms which would be more in tune with the psychological &amp; biological preference for a healthy system. As discovered by the Breakspear Hospital, UK, many EHS have previously had a major electric shock which has changed their physiology (magnetite) which gives them a different characteristic than the general public. Nocebo was ruled out Rimbach studies. Observations were also noted in Rubin study whilst EHS were asleep.</p> <p>48 opinion of no association made between home and level of symptom omits to bring in data about workplace into the equation.</p> <p>Discussion on symptoms<br/>P114 45 the opinion that the effects disappear on blind testing is not conclusive, as effects may be masked in the second round due to residual exposure or unshielded conditions for other signal exposures. This has been noted in several DNA &amp; spindle animal tests within this document where recovery can only be achieved outside of a number of hours. Additionally IEI-EMF persons are mixed in with general public so any statistically significant effects from EHS persons would be swallowed up by the whole. No field measurements are reported to confirm there are</p> | <p>nocebo effect as one possible mechanism explaining the association between self-reported exposure to RF and self-reported symptoms. No change in the text is required.</p> <p>The summary of the literature is accurate. No change in the text is required.</p> <p>This comment was taken into account and the text in the discussion of the section ("3.6.3 Symptoms") was amended accordingly.</p> |
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|   |                                  | <p>no signals in the second round so to assert a nocebo effect is not proved.</p> <p>Additionally EHS should be segregated into source sensitive immediately sensitive and those EHS with latent more diffuse symptoms. Objective testing such as galvanometer on skins would be appropriate as well as brainmapping as well as recording frequency &amp; voltage observations for EEG, ECG, EMG as appropriate.</p>  | The SCENIHR considers that no changes in the text are required.  |
| 123. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom                          | 3.5.3.2. Observational studies   | <p>3.5.3.2. Observational studies p. 112, line 4-6.</p> <p>We note the following additional study for consideration:</p> <ul style="list-style-type: none"> <li>• Subjective symptoms related to GSM radiation from mobile phone base stations: a cross-sectional study, Gómez-Perretta et al., BMJ Open, 3(12):December 1, 2013.</li> </ul>  | The literature cut-off date was extended and the additional literature has been considered.  |
| 124. Bevington Michael, ElectroSensitivity UK, michael@es-uk.info, United Kingdom | 3.5.3.3. Conclusions on symptoms | <p>This section is methodologically completely invalid (termed 'Voodoo' or 'pseudo' science by experts) and should be replaced with an up-to-date assessment by a medical expert experienced in diagnosing IEI-EMF using objective measurements. Established IEI-EMF factors: (a) non-linear and often subconscious, invalidating conscious provocation tests based on a linear dose-response hypothesis as used in this draft (Li &amp; Heroux 2013; McCarty et al 2011; Margaritis et al 2013); (b) all the population, not just IEI-EMF, can be sensitive to subconscious and conscious effects; effects can be delayed; screening of IEI-</p> | <p>The literature cut-off date was extended and the additional literature has been considered.</p> <p>The discussion of the section ("3.6.3 Symptoms") was amended to clarify methodological issues.</p> |



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|   |                                  | EMF subjects is essential (Havas et al 2010; Havas & Marrongelle 2013; Havas 2013; Huttenen 2009 2011); (c) all IEI results must be individual not averaged; sham after real is invalid; (d) key IEI-EMF studies are on masts etc (Augner et al 2010; Buchner & Eger 2011; Eskander et al 2012; Khurana et al 2010; Levitt & Lai 2010; Roelfsema et al 2011); (e) IEI microwave hearing (Frey 1961) still valid; (f) calcium flux IEI-EMF symptom mechanism (Pall 2013); (g) geomagnetic IEI-EMF, cryptochromes (Close 2012; Foley et al 2011; Sajedi & Abdollahi 2012; Yang et al 2011; Zaporozhan & Ponomarenko 2010;) (h) earthing, inflammation (Chevalier 2012; De Luca et al 2010; Oschman 2011); (i) cardiac effects (Zipes 2012); (j) genetic variants in IEI-EMF (Caccamo et al 2013); (k) IEI to non-thermal electronic warfare. |   |
| 125. Jelinek Lukas, National Institute of Public Health, elmag@szu.cz, Czech Republic | 3.5.3.3. Conclusions on symptoms | Explanation:<br>The section focuses on the so-called "electromagnetic hypersensitivity" and concludes that there is lack of evidence showing a causal relationship to EMF, i.e. the section is showing what "electromagnetic hypersensitivity" is not. There are, however, publications that explain what "electromagnetic hypersensitivity" actually is. Among many, the most important is [1], where many reasons are given to denote "electromagnetic hypersensitivity" as psychosomatic disease. This statement was later repeatedly supported by experiments, e.g. [2]  | This is a duplicate comment; see the response to the comment 117. |

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|  |  | <p>using fMRI and sham exposure. Following the scientific method, a hypothesis which hasn't been disproved has to be considered as valid. In this case, the hypothesis of the electromagnetic hypersensitivity being a psychosomatic disease has been further supported by many experiments.</p> <p>[1] C. J. Gothe, C. Molin, C. G. Nilsson, "The environmental somatization syndrome", Psychosomatics 36, pp. 1-11, (1995).</p> <p>[2] M. Landgrebe, W. Barta, K. Rosengarth, U. Frick, S. Hauser, B. Langguth, R. Rutschmann, M. W. Greenlee, G. Hajak, P. Eichhammer, "Neuronal correlates of symptom formation in functional somatic syndromes: a fMRI study", Neuroimage 41, pp.1336-1344, (2008).</p> <p>Amendment to the Opinion: The subsection "3.5.3.3. Conclusions on symptoms" must contain information that the new evidence still supports the hypothesis that "electromagnetic hypersensitivity" or "electrosensitivity" is of psychogenic etiology.</p> |  |
| 126. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom | 3.5.5. Conclusions on the health effects of exposure to RF | <p>P120 46 event-related potentials and delta wave results are only inconsistent because original EEG observations are not used as a relative measure.</p> <p>Other effects</p> <p>P121 10 conflicting results could be due to opposite effects noted in male &amp; females whereby segregation could yield more insightful results.</p> <p>Neoplastic</p> <p>23 opinion states mostly negative which obscures</p>   | The comment has been considered and the discussion of the section was amended accordingly. |

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|  |  | those tests which have raised positive results which are more informative to focus on. 27 opinion of some cases of DNA breaks and spindle disturbances does not reflect the significantly statistical constant reports not just in this section but throughout the whole document of DNA breaks, DNA fragmentation, spindle disturbances including invitro tests.  | Text was changed for the sake of clarity.                         |
| 127. Rowley Jack, GSMA, jrowley@gsma.com, United Kingdom     | 3.5.5. Conclusions on the health effects of exposure to RF | 3.5.5. Conclusions on the health effects of exposure to RF p. 120-121. The conclusions in respect of the individual endpoints and the lines of evidence are clearly stated but the section does not provide an overall risk assessment in regard to RF exposure and in particular does not explicitly indicate the conclusions in respect of the adequacy of present EU recommended RF exposure limits for either workers or the public.   | This comment has been addressed in the text of the final Opinion. |
| 128. Brooker Ian, Tyco, ibrooker@tycoint.com, United Kingdom | 3.6.2. What has been achieved since then                   | Section 3.6.2, Page 121 lines 36-49 and Page 122 lines 1-55<br>Please include the study where Weinberger et al looked at the probabilities and thresholds of peripheral nerve stimulation on human volunteers. Although the paper refers to MRI exposure and PNS differences below and above 100kHz, the resultant information includes probabilities and thresholds of peripheral nerve stimulation in extremities at IF frequencies.<br>Paper Reference: Weinberg I, Stepanov P, Fricke S, Probst R, Urdaneta M, Warnow D, Howard Sanders H, Glidden S, McMillan A, Starewicz P, | New text has been inserted.                                       |

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|   |  | Reilly J. Increasing the oscillation frequency of strong magnetic fields above 101 kHz significantly raises peripheral nerve excitation thresholds. Med. Phys. 39 (5), May 2012, 2578-2589   |  |
| 129. Professor Henshaw<br>Denis Lee, University of<br>Bristol, UK,<br>d.l.henshaw@bris.ac.uk,<br>United Kingdom | 3.7. Health effects<br>from ELF fields | <p>Introduction:</p> <p>While there are some welcome statements, I find sect. 3.7 to be particularly weak, overly dependent on epidemiology and devoid of scientific insight. In particular, the report displays a complete lack of scientific understanding of how magnetic fields, MFs interact with biological systems in a manner which causes the widely reported health effects. Sect. 3.7 is unrescuable in its present form. It serves only to prevaricate and deny our scientific understanding of ELF MF health effects. It does nothing for the Precautionary Principle, or to protect 500 million EU citizens. This section, and probably the whole Report, should be abandoned by the EU.</p> <p>Why the Report should be abandoned: All living systems appear to be MF-sensitive, so it should come as no surprise that this includes adverse health effects in man. The following areas of Bioelectromagnetics are out of the SCENIHR remit, yet are the very areas where significant advances in scientific understanding are being made:</p> <p>(i) Health effects of solar-geomagnetic activity/storms, SGMA below 100nT - A well established literature indicates acute effects, such as increase in depressive illnesses, melatonin disruption, heart rate variability and blood</p> | <p>This is a personal view. No changes in the text are required.</p> <p>Risk management is outside the scope of the opinion.</p> <p>Chapter on mechanisms has been included.</p> |

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|                                     |                     | <p>pressure changes.</p> <p>(ii) Magnetoreception in microorganism, fungi and plants – A well established research literature with many excellent reviews.</p> <p>(iii) MF effects on pain threshold – wide ranging across animal species, with some reporting effects below one microtesla.</p> <p>(iv) Animal magnetoreception and navigation - Many animal species, especially birds have been shown to detect MF changes below 50 nT and thresholds of 10 nT have been suggested. Candidate primary interaction mechanisms centre on magnetic particles in the body and action by the Radical Pair Mechanism, RPM in cryptochrome protein molecules. Overall, patterned or randomly varying MFs at levels below 100 nT appear to be particularly biologically active. Candidate causal pathways:</p> <p>Magnetic particles in the human body, notably in the brain and blood ferritin, and RPM action on cryptochromes both transduce low intensity MFs producing initial biological responses. Thereafter, the extensive reports of MF-induced Ca<sup>2+</sup> efflux, gene expression, ROS release by cells and circadian rhythm disruption, represent causal pathways to MF-induced disease. The recent report of MF-induced Genomic Instability in cells is particularly relevant to cancer (Luukkonen et al Mut.Res. 760 (2014):33– 41).</p> |  |
| 130. Mieszczanski Michael, ENTSO-E, | 3.7. Health effects | Some changes in the general conclusions would improve the overall consistency of the report:  |  |

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| <p>michael.mieszczanski@entsoe.eu, Belgium</p> | <p>from ELF fields</p> | <ul style="list-style-type: none"> <li>Epidemiological results on childhood leukaemia remain, over the last decades, the main hypothesis for possible health effects. ENTSO-E shares the general opinion that the recent results do not change the (now 12-year-old) IARC assessment that ELF EMFs are possibly carcinogenic; nevertheless, we do not consider that recently published results are fully consistent with earlier findings. The pooled analysis published in 2010 has found relative risks which are non-significant in themselves and lower than previously. Secondly, the pooled analysis on remission and survival after ALL published in 2012 is also of importance, and it should not be ignored in the conclusions. In our mind, both these two results, along with others, weaken the hypothesis of a causal link between ELF EMFs and childhood leukaemia. Limiting the general conclusion to stating that recent epidemiological results are “consistent with earlier findings” does not therefore fully reflect the current state of the science and we suggest a more balanced conclusion, such as “The new epidemiological studies do not alter the earlier findings ...”.</li> <li>We also consider that the general conclusions (Abstract, Executive Summary and “Conclusions on epidemiological studies” in page 125) are lacking a statement about other cancers. These general conclusions should also endorse the general finding that “studies on other childhood or adult cancers show no consistent association,</li> </ul> | <p>The comment does not contradict the Opinion. However, the SCENIHR prefers the wording that already exists in the text.</p> <p>This has been considered. The text has been amended accordingly.</p> |
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|   |  | suggesting the observed association remains an issue solely for childhood leukaemia”.  |   |
| 131. Robson Iris,<br>irisrobson@outlook.ie,<br>Ireland          | 3.7.1.1.<br>Epidemiological<br>studies | I was looking for mention of Baldi et al 2011 Occupational and residential exposure to electromagnetic fields and risk of brain tumours in adults: a case-control study in Gironde, France in the SCENIHR preliminary opinion, but I cannot find it mentioned. Why is this? It shows a trebling of risk of the brain tumour meningioma. Please can you include this study in your review or explain exactly why it was left out<br><br>Thank you   | The reference has been taken into account in the final Opinion.   |
| 132. Souques Martine, EDF,<br>martine.souques@edf.fr,<br>France | 3.7.1.1.<br>Epidemiological<br>studies | p 123 line 25 'the previous assessment of the 2009 SCENHIR statement on a possible association between long term exposure to ELF magnetic fields and an increased risk of childhood leukaemia remains valid,' which remains consistent with the IARC classification as 2B in 2001. Page 123 lines 41-42: the wording suggests that the meta-analysis by Kheifets found a dose-effect relation. This is not the case because none of the odds ratios are statistically significant. To perform a trend test and show a dose-effect relation, at least one of the odds ratios must be statistically significant.<br><br>Page 124 lines 29-30: Why is there suddenly this message that interpretation must be prudent? The same reserves were not expressed for Kheifets's study, cited above, even though the studies it | This is a personal view. No change in the text is required.<br><br>Statistical significance is not claimed in the text; the ORs are just listed. No change in the text is required.<br><br>The text just states the conclusions of the authors of the study. The text of the Opinion was changed for the sake of clarity. |

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|  |  | <p>included are all equally heterogeneous. Page 125 lines 7-12: This passage deserves to be placed earlier in the report (at the very beginning of the section 'childhood cancer') and kept in mind during the analysis of epidemiologic studies throughout the rest of the report. Page 125 line 16: it cannot be concluded that the risk of childhood leukaemia is statistically increased above 0.3-0.4 <math>\mu</math>T. There is no dose-effect relation in the epidemiologic studies. The threshold must be specified, as the proportion of the population concerned is not at all the same in terms of the number of people exposed. Page 125 line 18: the studies do not show a relation with survival in children with leukaemia. How could the same factor induce the onset of cancer and not its relapse? This is logically inconsistent. These results should be taken into account in the conclusion to the section on childhood leukaemia.</p> <p>The negative results of the studies about the duration of remission and of overall survival for acute lymphoblastic leukaemia indirectly confirm the animal data, which are equally negative about the cancer-promoting effect of prolonged exposure to magnetic fields.</p> <p>Page 125 line 32: after 30 years of research, we still face the same methodological problems. There are two routes to improving the results: better assessment of subjects' global exposure in taking into account all the exposure sources and not only</p> | <p>The comment has been taken into account.</p> <p>It is not possible to establish a specific threshold from epidemiological studies. No change in the text is required.</p> <p>The survival analyses showed consistency between onset and relapse. However, very little is known about environmental factors modifying relapse. No change in the text is required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> |
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|   |                                  | exposure in the home; and consideration of the duration of exposure, that is, not only the 24 h mean, but for how many months and years the subject lived at the address?  |   |
| 133. Souques Martine, EDF, martine.souques@edf.fr, France | 3.7.1.1. Epidemiological studies | <p>Page 125 line 38-40: 'Studies on other childhood cancers or adult cancers show no consistent association, suggesting the observed associations remain an issue solely for childhood leukemia'. This conclusion deserves to be included in the executive summary.</p> <p>Page 125 line 43: It is incorrect and misleading to talk about long-term exposure insofar as no study has taken into account the duration of exposure from birth or conception. It is always assumed that the child has never moved and has always lived at the address given at the initial consultation (or the address at birth, for some studies). This assumption is false: see M McBride 1999 (McBride M. et al. Power-frequency electric and magnetic fields and risk of childhood leukemia in Canada. Am J Epidemiol. 1999 May 1;149(9):831-42).</p> <p>Page 125 line 45: in view of all of the epidemiologic results on childhood leukaemia, we do not see how you can say that the association 'appears to be robust'. What is your definition of robust?</p> | <p>This comment was taken into account and the text has been amended accordingly.</p> <p>Some studies have done more extensive TWA modelling. No change in the text is required.</p> <p>The comment has been taken into account. The text has been changed for the sake of clarity.</p> |
| 134. Souques Martine, EDF, martine.souques@edf.fr, France | 3.7.1.1. Epidemiological studies | <p>The report raises a series of crucial questions that deserve a more detailed analysis.</p> <p>The consideration of exposure remains the Achilles' heel of epidemiologic studies, and none of them have provided a consistent solution.</p>  | The SCENIHR considers that no changes in the text are required.   |

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|  |  | <p>Accordingly, in the pooled analysis by L Kheifets cited on p 123, the exposure measurements from the different studies were all very different, without any logic linking them. Despite the authors' precautions, it is clear that nothing links an exposure measurement (for a duration that is variable) to the calculation of the field based on the closest electric line and only on the estimation of the distance between the home and the line. Moreover, Kroll's study showed that the classification of exposure from the distance between the residence and the lines was not consistent with the field levels calculated.</p> <p>2. Exposure is ubiquitous and is not limited to the proximity of lines or transformers. Moreover 3.3.9 states that the frequency content in the ELF range of public exposure is not limited to 50 Hz. We might question the representativeness of studies limited to measuring only 50-Hz fields. It is also appropriate to underline that the subjects included in the meta-analyses by Greenland and Ahlbom lived in a different electromagnetic environment than those included in the study by Draper, for example.</p> <p>3. 'The problem of dose assessment in epidemiology has not been taken into account...questions about how exposure is accumulated over many years need to answered'. No experimental data has made it possible to demonstrate the existence — or even the plausibility — of a cumulative effect of ELF EMFs.</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>.</p> <p>The comment does not contradict the Opinion. No change in the text is required.</p> |
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|   |                                  | This is nonetheless a fundamental hypothesis of the epidemiologic studies.   |   |
| 135. Souques Martine, EDF, martine.souques@edf.fr, France | 3.7.1.1. Epidemiological studies | <p>4. The consistency of the results of the three pooled analyses — Greenland (too heavy to be upload), Ahlbom and more recently Kheifets — is questionable. Yes, the results point in the same direction, but in Kheifets's pooled analysis, the odds ratio for the exposures greater than 0.4 <math>\mu</math>T compared to the exposures less than 0.1 <math>\mu</math>T was 1.46 and is not significant since the confidence interval includes the value 1. Moreover it is standard in epidemiology to consider that improving the consideration of exposure increases the precision of the result, producing a higher odds ratio and a narrower confidence interval (and it is fair to assume that the most recent epidemiologic studies have tried to take exposure into account better than the studies now nearly 20 years old); nonetheless the odds ratio has fallen slightly. Remember that in Ahlbom's pooled analysis, the odds ratio for exposures &gt; 0.4 <math>\mu</math>T was equal to 2 and statistically significant. As the report's authors recognize: 'Overall, the association is weaker in the most recently conducted studies'. This inconsistency deserves to be underlined in the summary.</p> <p>5. Finally in terms of the public health impact, if we consider the association observed to be causal, the population concerned, according to the exposure criteria chosen, is particularly low since there are 23 cases of leukaemia in 10,865 children</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>This comment pertains to risk management, which is outside of the scope of this opinion. No change in the text is required.</p> |

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|  |   | <p>studied over a 40-year period who are exposed in Kheifets's meta-analysis to values of more than 0.3 <math>\mu</math>T on average, that is, to one case every two years. While some uncertainty clearly remains, it does not make it a significant public health question that requires drastic choices of risk management.</p> <p>6. The negative results of the studies about the duration of remission and of overall survival for acute lymphoblastic leukaemia indirectly confirm the animal data, which are equally negative about the cancer-promoting effect of prolonged exposure to magnetic fields</p>  | <p>The SCENIHR considers that no changes in the text are required.</p>   |
| <p>136. Souques Martine, EDF, martine.souques@edf.fr, France</p> | <p>3.7.1.1. Epidemiological studies</p> | <p>7. In fact, the essential question, which has not been faced in any epidemiologic study, concerned 'the first hit', that is, the first stage of the leukaemogenic process that might occur during fetal life due to exposure of the pregnant mother. We regret that this point is not discussed at all in the body of the report. It calls into question the major criterion of causality: a temporal relation. Did exposure precede the onset of the effect? Yes, if we consider the promoting effect, secondary to the first hit, and if we take into account the exposure of children at their residence since birth, but no, if exposure was assessed at home the year of diagnosis (which is the case in most epidemiologic studies); and no, if the process considered is the 'first hit' since these exposure studies tell us nothing about maternal exposure during pregnancy.</p> | <p>It is clearly stated in the opinion that little progress has been made in explaining the finding. The text was changed for the sake of clarity.</p> |

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|  |   | <p>In conclusion, in view of the inadequacy of the exposure estimates and their lacunae, the heterogeneity of the studies, and the reduction, albeit modest, in the odds ratio for the most exposed populations, it does not appear logical to conclude simultaneously that the studies, some of which are thoroughly negative, are consistent and that the association observed is robust. Certainly no scientific procedure can rule out the existence of a risk, but these data, associated with 'the persistent negative results in experimental studies in animals' and with the absence of results from studies of the survival of children with leukaemia, make it more improbable than probable that a real association exists between the risk of leukaemia in children and exposure to ELF EMF. 'Epidemiology stands alone' but ever less firmly</p> | <p>The wording of the text has been changed (the word "robust" is not used in any more this context).</p> |
| <p>137. Souques Martine, EDF, martine.souques@edf.fr, France</p> | <p>3.7.1.1. Epidemiological studies</p> | <p>With respect to childhood leukaemia. One point must be considered in particular, regardless of the study: exposure assessment. In experimental studies, the exposure system is not always described well enough to allow the study to be replicated and especially, at strong exposure, we do not know whether, and if so how, the noise and vibrations emitted by the system are taken into account. The epidemiologic studies never consider the duration of exposure. It is an exposure indicator that is assessed at birth or, more often, at diagnosis, but without knowledge of this exposure from conception to diagnosis. We</p>  | <p>The comment has been considered.</p>   |

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|                   |                  | <p>therefore cannot talk of long-term effects. The indicator most often taken into account in the epidemiologic studies is the mean. But which one? The arithmetic mean or the geometric mean? By default, is the most detrimental choice appropriate, that is, the arithmetic mean? We must not forget that the two meta-analyses published in 2000 considered different indicators: Ahlbom used the geometric mean and Greenland (to heavy to be upload) the arithmetic mean. In the former, a statistically significant increase in the risk of childhood leukaemia was demonstrated for a geometric mean exposure (24 h) <math>\geq 0.4 \mu\text{T}</math>. In the second, a statistically significant increase in the risk of childhood leukaemia was demonstrated for an arithmetic mean exposure (24 h) <math>\geq 0.3 \mu\text{T}</math>. The geometric mean is always less than (or equal to) the arithmetic mean. The results of these two meta-analyses are therefore inconsistent. Moreover, only one source of ELF EMF has been studied. If we hypothesise that EMF increase the risk of childhood leukaemia, then it is all exposure that must be studied, taking all sources into account and not just the most visible. Moreover, most epidemiologic studies are overinterpreted, with a multiplication of statistical tests on the tails of distributions, which results in statistically significant results due purely to chance, without any ability to distinguish these from really significant tests.</p> |                                       |
| 138. Lyrae Velma, | 3.7.1.2. In vivo | P126 44 a-amylase whilst not being suitable for  | The SCENIHR considers that no changes |

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| VelmaLyræ@hotmail.co.uk, United Kingdom                   | studies                   | animals could be a suitable biomarker/ mechanism in humans.   | in the text are required.  |
| 139. Souques Martine, EDF, martine.souques@edf.fr, France | 3.7.1.2. In vivo studies  | <p>Page 128 lines 15-19: future in vivo studies must include in utero exposure. That has already been done, and the results did not show any diseases — cancers or other — associated with EMF exposure at 50 or 60 Hz (Yasui 1997, Mandeville 1997-too heavy-, Harris 1998-tooheavy-, Mc Cormick1999, Boorman 1999-too heavy).</p> <p>Page 128 lines 18-19: the environmental exposure levels have been studied in the past and the results showed nothing. The high exposure levels used in the studies take the hypothesis of a dose-response relation into account. If an effect is found at a strong exposure, the lowest no adverse effect level could be sought.</p> | <p>No changes in the text are required. While we agree that some studies with prenatal exposure have been carried out, they did not use the newer mouse models, so doing prenatal exposure does not seem unreasonable.</p> <p>No changes in the text are required. We agree with the comment about exposure levels. The text is not inconsistent with the comment.</p>   |
| 140. Lyræ Velma, VelmaLyræ@hotmail.co.uk, United Kingdom  | 3.7.1.3. In vitro studies | <p>P128<br/>20 opinion that strain-specific increases in sensitivity is intriguing and lead to biomarkers could be applied to EHS persons with the benefit of objective testing.</p> <p>44 acute effects on ion homeostasis especially CA2+ could be added to the list of biomarkers and mechanisms</p> <p>51 opinion discounts results due to being pooled but accepts this method in earlier tests where country results are pooled. This method is likely to obscure valuable information.</p> <p>P129<br/>35 Opinion that studies give at least modest DNA-damaging activity is not reflective of the vast</p>  | <p>The SCENIHR considers that no changes in the text are required.</p> <p>This has already been included in the text in the list of relevant endpoints. No change in the text is required.</p> <p>It is clear in the text why this metadata-analysis cannot be used for assessing risk from in vitro results. No change in the text is required.</p> <p>The comment has been taken into account. The distinction between fixed</p> |

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|  |   | <p>significantly consistent data which shows DNA damage</p> <p>P130</p> <p>48 opinion on significant effects regarding melatonin should mention its link to sleep disorders</p> <p>Discussion on in vitro studies</p> <p>P131</p> <p>7 Effect on signal transduction and gene expression could be added as a possible mechanism.</p>   | <p>and non-fixed DNA damage has been made clearer in the text.</p> <p>The comment is not applicable in this context. No change is needed in the text.</p> <p>The SCENIHR considers that no changes in the text are required.</p>                                |
| 141. Souques Martine, EDF, martine.souques@edf.fr, France                  | 3.7.1.3. In vitro studies                   | <p>Page 131 line 10: this is inconsistent with the epidemiologic approach that considers that the children are under the lines at all times.</p> <p>p131 line 13-4: the in vitro studies included in the 2013 analysis: 'suggest that ELF EMF can induce both genotoxic and other biological effects in vitro at flux densities of 100 <math>\mu</math>T and higher'. This information confirms the conclusions of the RAPID program to replicate in vitro experiments. There is accordingly nothing new on this subject, and these exposure values are not encountered in everyday life. They therefore could not, even if they were replicated and validated, which they have not yet been, provide a basis for explaining a carcinogenic mechanism.</p> | <p>The SCENIHR disagrees with this comment. Epidemiological studies do not assume that children are under the lines at all times. No change in the text is required.</p> <p>The comment does not contradict the Opinion. No change in the text is required.</p> |
| 142. O'Dea Pascal, Pylon Alternatives Alliance, pkodea@eircom.net, Ireland | 3.7.1.4. Conclusions on neoplastic diseases | <p>As a medical doctor /family practitioner I wish to draw your attention to the Geocap study ,2002-2007 Childhood leukaemia close to high-voltage power lines which concurs with the previous epidemiological evidence of a doubling of Acute</p>   | <p>The study has been considered.</p>   |



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|  |   | childhood leukaemia in proximity of 50 m from the high voltage power lines. British journal of cancer (2013)108,1899-1906.Prof Henshaw Emeritus Bristol UK, suggests several causes for the doubling related to ELF EMF, and I would recommend the committee's attention to his references  |   |
| 143. O'Dea pascal, Pylon Alternatives Alliance, pkodea@eircom.net, Ireland | 3.7.1.4. Conclusions on neoplastic diseases | The Geocap study BJC 2013 confirms the doubling of Childhood ALL ,I suggest your committee take note of Prof Henshaw Emeritus Bristol UK regarding causal links to emf and childhood ALL  | The study has been considered. Chapter on mechanism has been added. |
| 144. Pophof Blanka, BfS, bpophof@bfs.de, Germany                           | 3.7.2.1. Epidemiological studies            | Page 132, line 8-15, Meta-analysis by Zhou 2012 The is a more recent meta-analysis (Vergara et al.2013) covering a higher amount of studies (42) and coming to a similar, but slightly deviating result. Motor neuron disease risk seems to be associated with occupational titles (but not exposure). AD risk was associated with estimated MF levels. | Study has been considered.  |
| 145. Pophof Blanka, BfS, bpophof@bfs.de, Germany                           | 3.7.2.1. Epidemiological studies            | Page 132, line 8-15, Meta-analysis by Zhou 2012 The is a more recent meta-analysis (Vergara et al.2013) covering a higher amount of studies (42) and coming to a similar, but slightly deviating result. Motor neuron disease risk seems to be associated with occupational titles (but not exposure). AD risk was associated with estimated MF levels. | Study has been considered.  |
| 146. Souques Martine, EDF, martine.souques@edf.fr, France                  | 3.7.2.1. Epidemiological studies            | Page 132 line 5: 95% CI. page 132 line 22-24 'Only a few new epidemiological studies...have been published since  | The SCENIHR considers that no changes in the text are required.     |



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|  |  | <p>period of recording) and the sway area (Area of the smallest polygon that includes the entire trajectory of the center of pressure). Put together, and pending replication studies, these results suggest the possibility of a MF effect leading to a small increase in tremor amplitude and to a small decrease in standing balance oscillations.</p> <p>Another point of interest is that the 73 participants, which were tested according to a double blind protocol (both the experimenter and the subject were wearing earplugs to avoid any potential auditory clue), were not able to detect the presence of the MF exposure: A Chi square test confirmed that the subjects were not capable to detect the presence of the field when it was actually presented.</p> | <p>This study has now been summarised in the section of the opinion relating to subjective outcomes.</p> |
| <p>148. Legros Alexandre,<br/>LHRI,<br/>alegros@lawsonimaging.ca,<br/>Canada</p> | <p>3.7.2.2.<br/>Neurophysiological<br/>studies</p> | <p>Page 133, lines 22 to 33: The exposure duration in this study was in fact one hour (it is illustrated in the Figure 3 of the paper), and not 30 minutes as mentioned in the report (line 23).<br/>Page 133, line 27: The report says: "They claim that they used a double blind design. However, only subjects were fitted with ear plugs to reduce perception of audible noise caused by the exposure coils." In reaction to the statement, although we acknowledge that it is not explicitly specified in the original publication, we would like to confirm that the experimenter was also wearing earplugs, and that it was an actual double blind design.</p>  | <p>The text of the Opinion has been modified.</p> <p>The text of the opinion has been modified.</p>      |

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| <p>149. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p> | <p>3.7.2.2. Neurophysiological studies</p> | <p>29 inconsistencies can be ironed out by recording the human range of baseline EMG results to action potentials and noting the interval between the two in all assessment calculations.<br/>P133<br/>20 ANOVA testing for sway velocity could be an objective measuring tool for assessment of EHS.<br/>27 magnetic field applied over sagittal plane with perpendicular direction highlights the effects of different directions and exposure sites which if not noted could lead to negative finds where in fact it is because the direction is not appropriate to set off symptoms. i.e. underfoot which has been noted previously when analysing data of transformers being in flat below giving enhanced exposure to floor above.<br/>P 133 (55) – P134 (2) acute thermal pain stimuli at hypothenar region of right hand could indicate ELF MF inducing neuromodulation. This could be a biomarker/mechanism to explain EHS as additionally a subgroup of EHS also have fibromyalgia where it has recently been discovered that the hands and feet of fibromyalgia patients have extra sensory receptors not yet published due to newness 2013</p> | <p>The comment refers to the previous SCENIHR Opinion. No change in the text is required.</p> <p>This is a suggested hypothesis without scientific evidence. No changes in the text are required.</p> <p>The assumption that exposure to MF of different orientation could lead to negative effects is not scientifically supported. No change in the text is required.</p> <p>This is a suggested hypothesis without scientific evidence. No changes in the text are required.</p> |
| <p>150. Souques Martine, EDF,<br/>martine.souques@edf.fr,<br/>France</p>  | <p>3.7.2.3. In vivo studies</p>            | <p>Page 139, line 50. About the exposure levels considered in the experimental studies: if the exposure levels are very much higher than environmental exposures, it is because everyone started with the hypothesis of a dose-response relation. In the past, studies were performed with</p>   | <p>The SCENIHR considers that no changes in the text are required.</p>  |

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|  |                           | lower exposures, and they produced negative results.  |  |
| 151. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom | 3.7.2.4. In vitro studies | <p>P136<br/>18 results are attributed to differential effects on neurotransmitters which could be clarified in humans with brainmapping thereby identifying which dominant neurotransmitter is present in each candidate i.e. dopamine, serotonin, GABA, acetylcholine – and which neurotransmitter is depleted. As GABA dominant individuals form the majority of the population this could give insight into subgroups of other dominant neurotransmitter types such as EHS persons and could be a critical biomarker.</p> <p>54 Conclusion that treatment with insulin reversed this sensitivity suggests that the BBB vulnerability could be sensed and therefore an indicator in EHS perception. Opinion should rightly say that increased insulin reversed the sensitivity as diabetics would need to sustain their daily treatment regime during testing.</p> <p>P137<br/>54 force on oligosaccharide side chains bound to ion-channel gates in membrane could be a useful biomarker mechanism for EHS as ion gate channels has previously been put forward as a mechanism for EHS by Dr Andrew Goldsworthy</p> <p>P138 50 Opinion gives a preample of protective effects but this is not substantiated as the report states</p> <p>P139 2 a significant decrease in dopamine levels</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>The SCENIHR does not agree. The authors reported the protected effect. No change in the text is required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> |

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|  |                   | amongst other effects. Conclusions on in vivo studies 50 mechanisms that give reactive oxygen species may correspond to hidden harmonics which have been acknowledged to occur between multiple sources in the everyday environment which are relevant for assessment purposes. 183.7.2.4. In vitro studies 140 P140 37 in vitro findings could be via brainmapping would reveal clear results on transmitter systems.  |   |
| 152. Bevington Michael,<br>ElectroSensitivity UK,<br>michael@es-uk.info,<br>United Kingdom | 3.7.3.1. Symptoms | IEI-EMF MF effects are established (Carruba 2009 2010; McCarty et al 2011).   | The mentioned references have been considered. No change in the text is required.                   |
| 153. Legros Alexandre,<br>LHRI,<br>alegros@lawsonimaging.ca,<br>Canada                     | 3.7.3.1. Symptoms | Page 142, lines 22 to 25: Since in the section '3.7.3.1. Symptoms', page 141 - line 35 to 50, the results from studies conducted on a single participant are extensively reported (i.e. the studies from McCarty), we think that the paragraph reporting the work from our group at 1.8 mT should be completed with the results related to the subjective perception of MF exposure from these 2 studies: McNamee DA, Corbacio M, Weller JK, Brown S, Stodilka RZ, Prato FS, Bureau Y, Thomas AW, Legros A. (2011) The response of the human circulatory system to an acute 200 microtesla, 60 Hz magnetic field exposure. Int Arch Occup Environ Health, 84:267-277. Corbacio M, Brown S, Dubois S, Goulet D, Prato FS, Thomas AW, Legros AG. (2011) Human | The references have been considered and the text of the final Opinion has been amended accordingly. |

Cognitive Performance in a 3 mT power-line frequency magnetic field. *Bioelectromagnetics* 32(8):620-633

The first reference (McNamee et al., 2011) was involving 60 Hz MF exposure in humans at 200  $\mu$ T. A total of n=10 participants were involved, and the physiological variables were heart rate (HR) and heart rate variability (HRV), skin surface temperature. Blood pressure was also monitored. The exposure was delivered using the same apparatus as in Legros et al. (2012). This study concluded that no significant effects were observed either on HR, HRV or skin surface temperature. No effects on blood pressure were observed either. Interestingly, a chi-square test conducted on participant data regarding field detection showed that participants were unable to accurately guess the MF exposure condition (sham or exposed). Note that both the subject and experimenter used earplugs during testing sessions to ensure the field presence was not audible.

The second reference is already described in a prior section, and we think that it would be of value to report that the results of the Chi Square test conducted on the Field Status Questionnaires from the 99 subjects who took part to this experiment: it demonstrated that the participants were not capable of perceiving the exposure to 3000  $\mu$ T at 60 Hz given for a period of 1 hour.

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| <p>154. Legros Alexandre,<br/>LHRI,<br/>alegros@lawsonimaging.ca,<br/>Canada</p> | <p>3.7.3.1. Symptoms</p> | <p>Page 142, lines 22 to 25:<br/>We also think that this study from our group could be reported in this section:<br/>McNamee DA, Corbacio M, Weller JK, Brown S, Stodilka RZ, Prato FS, Bureau Y, Thomas AW, Legros A. (2010) The cardiovascular response to an acute 1800 microtesla, 60 Hz magnetic field exposure in humans. Int Arch Occup Environ Health, 83:441-454<br/>The study was involving n=58 volunteers (mean age 27 +/-8.5 years) in a double-blinded protocol involving MF exposure at 60 Hz, 1800 microtesla (1 hour of exposure, real or sham). The monitored physiological variables of interest were heart rate (HR) and heart rate variability (HRV), skin surface temperature. The exposure was delivered using the same apparatus than in Legros et al. (2012). The conclusion was that the MF exposure did not have any significant effect on HR or HRV. A marginal increase of skin temperature was noted, which was however pointed out as a possible consequence of small temperature fluctuations in the room due to the exposure, without completely ruling out the possibility that the MF exposure was originating this effect. It is important to notice that a chi-square test was conducted on participant data regarding field detection showed that participants were unable to accurately guess the MF exposure condition (sham or exposed). Note that "Both the subject and experimenter used earplugs during testing sessions to ensure the field</p> | <p>The references have been considered and the text of the final Opinion has been amended accordingly.</p> |
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| <p>155. Lyrae Velma,<br/>VelmaLyrae@hotmail.co.uk,<br/>United Kingdom</p> | <p>3.7.3.1. Symptoms</p> | <p>presence was not audible.”</p> <p>P141<br/>43 Opinion now dissuades from a perceived signal on? or signal off? approach for identifying EHS which would negate previous studies cited in the document which aimed to provide evidence of absence of sensitivity by not being able to perceive signals in both rounds.</p> <p>P142<br/>3 painful thermal stimulation can be measured by CHAPs sensory nerve testing for EHS proving under blind conditions</p> <p>142 34 Opinion that it seems unlikely that reports are true,( i.e. that emf exposure yielded high mental disorders and high social dysfunction) is purely subjective &amp; not consistent with evidence from M.I.T. And Yale studies which confirm an effect on behaviour. ****unable to upload due to file restrictions</p> <p>37 WIFI or non-WIFI factors have not been factored into the equation.</p> <p>Conclusion on symptoms</p> <p>49 Opinion of discordant results suggests results with inharmonic features which could be a feature of the harmonics in the environment or refer to the unique individual frequencies of each EHS individual and their unique frequency sensitive trigger. By noting EEG frequencies of individual's readings this can clarify why some test situations are able to trigger the sensitivity and why other test situations (with different frequencies) are not</p> | <p>The text of the opinion is consistent. No changes are required.</p> <p>The SCENIHR considers that no changes in the text are required.<br/>The observation that it is unusual for almost all of the participants in a study to have “social dysfunction” (94.5%) stands.</p> <p>The SCENIHR considers that no changes in the text are required.<br/>The SCENIHR considers that no changes in the text are required.</p> |
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|   |                               | able to trigger the same symptoms or to show with the same individual.  |   |
| 156. Souques Martine, EDF, martine.souques@edf.fr, France | 3.7.3.1. Symptoms             | <p>Page 141, line 35-52: this attributes a lot of importance to a study of 1 volunteer, while on page 142, lines 22-25, almost nothing is said of the Canadian studies of 1000-3000 <math>\mu\text{T}</math>, with more than 300 volunteers who served as their own controls: there was no discrimination between the sham sessions and the exposed sessions, and no symptoms reported during exposure. p 142 line 49-52 'The studies published since 2009 opinion show discordant results. However observational studies suffered from weaknesses and do not provide convincing evidence of an effect of ELF exposure of symptoms in the general population, and most experimental evidence also points to the absence of any causal effect.'</p> <p>This conclusion deserves to be included in the executive summary.</p> | Identifying a single participant who consistently reacts to the presence of EMF would demonstrate the existence of electromagnetic hypersensitivity. No change in the text is required. |
| 157. Arthurs Louisa, larthurs53@gmail.com, Ireland        | 3.7.3.2. Reproductive effects | I was looking for Mahmoudabadi et al 2013, Exposure to Extremely Low Frequency Electromagnetic Fields During Pregnancy and the Risk of Spontaneous Abortion: A Case Control Study, in the SCENIHR preliminary opinion, but it doesn't appear to have been mentioned. Why is this? I realise it was published in July of last year, but you included Benson et al, mobile phone use and risk of brain neoplasms and other cancers which doesn't seem to have been published until september 2013. Mahmoudabadi should surely   | The study has been considered.  |

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|   |   | have been within the time frame as well? Please can you include this study in your review or explain exactly why it was left out. Thank you   |   |
| 158. Brennan Patrick,<br>patrickbrennan57@yahoo.<br>ie, Ireland | 3.7.3.2.<br>Reproductive<br>effects                                     | I can find no mention of Panagopoulos et al 2013 ELF Alternating Magnetic Field Decreases Reproduction by DNA Damage Induction, in the SCENIHR preliminary opinion, but I cannot find it mentioned. Why is this? Please can you include this study in your review or explain exactly why it was left out. Thank you   | The study has been considered.                                  |
| 159. <i>No agreement to<br/>disclose personal data</i>          | 3.7.3.3. Effects of<br>fetal exposure to<br>ELF on children's<br>health | The discussion of Li et al (2011) study is inadequate. The study has no clearly stated a priori (or plausible) hypothesis, and the analyses appear to be driven by the data. (The introduction and some of the references confuse RF and ELF exposures.) No justification provided for choice of exposure metric; Li's previous pregnancy outcome study used peak, the current study uses median. Potentially key confounders, such as viral infections, breast feeding and ambient air pollutants, are not adjusted for in the analyses. No clear explanation for outcome definition; two mentions of asthma within one year are required. This definition excludes more than a third of cases. Inclusion of the excluded cases lowers the relative risk. The discussion of Li et al (2012) study is inadequate. The comments above regarding the Li et al (2011) study apply to this study as well and it should be noted:<br><ul style="list-style-type: none"> <li>• No justification for exposure metric and cut-point choices is provided.</li> </ul> | The SCENIHR considers that no changes in the text are required. |

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|  |  | <ul style="list-style-type: none"> <li>• The definition of obesity does not follow accepted standard definitions.</li> <li>• Inadequate discussion of potential confounders.</li> </ul>   |  |
| 160. Souques Martine, EDF, martine.souques@edf.fr, France  | 3.7.3.3. Effects of fetal exposure to ELF on children's health | Page 143, line 47-50: how can asthma or obesity be associated with a single 24 h EMF measurement in a single study? Same issue as for the childhood leukaemias: duration of exposure must be considered (in term of months and year). Moreover, the confounding factors are numerous and insufficiently taken into account.   | The SCENIHR considers that no changes in the text are required.  |
| 161. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom | 3.7.4. Conclusions on health effects of ELF exposure           | <p>P144</p> <p>28 assessment can only be made with regard to individual EEG which is unique.</p> <p>Action potentials at measureable sites may act within a ratio within the human system as a method of assessment calculation, i.e. geometric calculation rather than mathematical using relative ratios as used in the Golden Mean Michael Angelo.</p> <p>38 individual participants who reliably react to exposure discounts the presumption that EHS is a psychological illness.</p> | <p>The SCENIHR considers that no changes in the text are required.</p> <p>The SCENIHR considers that no changes in the text are required.</p> <p>JAs the Opinion notes, replication is important in these instances.</p> |
| 162. Souques Martine, EDF, martine.souques@edf.fr, France  | 3.7.4. Conclusions on health effects of ELF exposure           | <p>line 39-40: can studies of individual subjects be replicated?</p> <p>line 47-50: one cannot conclude that the risk of childhood leukaemia is statistically increased above 0.3-0.4 <math>\mu</math>T. There is no dose-effect relation in the epidemiologic studies. The threshold must be specified, for the proportion of the population</p>   | Yes. Repeating the study on a subsequent occasion, with the same participant, would constitute replication.  |

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|  |  | concerned is not at all the same in terms of the number of people exposed.   |  |
| 163. Keevil Stephen,<br>European Society of<br>Radiology,<br>stephen.keevil@kcl.ac.uk,<br>United Kingdom | 3.8. Health effects<br>from Static Fields<br>including MRI<br>exposure | <p>Sensory effects such as vertigo are well known in MRI, and increasingly well understood. In addition to the papers cited, we would draw attention to work by Roberts et al (2011) [1], Theysohn et al (2014) [2] and Glover and Gowland (2014) [3] amongst other recent papers. Observed changes in blood pressure are also consistent with theoretical expectations and, as stated, are within the range of physiological variability.</p> <p>P146<br/>line 19-22. The risk of accidents due to transient sensory effects is best mitigated through adoption of safe working practices and worker training rather than numerical exposure limits, especially in view of individual variation in the threshold and severity of these effects.</p> <p>P146 line 44 onwards. The work of Fiechter et al (2013) has been heavily criticised, see correspondence at <a href="http://eurheartj.oxfordjournals.org/content/34/30/2340/reply">http://eurheartj.oxfordjournals.org/content/34/30/2340/reply</a>. Not only is it 'not clear what part of the exposure in the scanner causes the effect' (p147 line 6), it is not even clear that any aspect of the EMF exposure is responsible, given the lack of controls in the experiment, concurrent exposure to paramagnetic contrast agent, and a number of other methodologically poor aspects of the study. There is an urgent need to replicate the study</p> | <p>The literature cut-off date was extended and the additional literature has been considered.</p> <p>Risk management is outside the scope of the opinion.</p> <p>The study has been considered.</p> |

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|  |                      |  | <p>under more scientifically rigorous conditions. The finding that MRI causes changes in the cortical silent period, as assessed using TMS (section 3.9.1), is also impacted by poor controls and the presence of possible confounding factors, notably acoustic noise.</p> <p>[1] Roberts DC et al (2011) MRI magnetic field stimulates rotational sensors of the brain. <i>Current Biology</i> 21 1635-1640.</p> <p>[2] Theysohn JM et al (2014) Vestibular effects of a 7 tesla MRI examination compared to 1.5 T and 0 T in healthy volunteers. <i>PLoS ONE</i> 9(3): e92104. doi:10.1371/journal.pone.0092104.</p> <p>[3] Glover P and Gowland P (2014) Comment on ICNIRP guidelines for limiting exposure to electric fields induced by movement of the human body in a static magnetic field and by time-varying magnetic fields below 1 Hz. <i>Health Physics</i> (in press).</p> | <p>The study has been considered.</p> <p>The study has been considered.</p> <p>Risk management is outside the scope of the opinion.</p> |
| 164. Kromhout Hans,<br>Institute for Risk Assessment Sciences,<br>Utrecht University,<br>Utrecht, The Netherlands,<br>h.kromhout@uu.nl,<br>Netherlands | 3.8.1. Human studies |  |   | The references have been considered in the text.  |
| 165. Lyrae Velma,<br>VelmaLyrae@hotmail.co.uk,<br>United Kingdom   | 3.8.1. Human studies |  | P146 7 Head ringing is a reliable symptom for EHS which can be attributed to the vagus nerve activation triggering the eustacian tube to produce tinnitus. The vagus nerve tone is affected by  | This is a suggested hypothesis without scientific evidence. No changes in the text are required.  |

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|  |                       |  | acetylcholine neurotransmitter triggered by choline depletion which has shown to be activated by mobile phone signals Henry Lai. **<br><br>49 immunofluorescence microscopy of foci could provide a biomarker   | This is a suggested hypothesis without scientific evidence. No changes in the text are required |
| 166. Pophof Blanka, BfS, bpophof@bfs.de, Germany           | 3.8.1. Human studies  |  | Page 146, line 1-8 (Heinrich 2012)<br><br>Within same study, also stress markers in blood and saliva were investigated, with a negative outcome (Gilles et al. 2013).   | The literature cut-off date has been extended and the literature has been considered.           |
| 167. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom | 3.8.2. Animal studies |  | P148 40 substantial exposure time is required which is also the case for those EHS with latent symptoms so segregation between immediate source sensitive EHS would prove more informative.   | The SCENIHR considers that no changes in the text are required.                                 |
| 168. Pophof Blanka, BfS, bpophof@bfs.de, Germany           | 3.8.2. Animal studies |  | Page 149, line 10-30. The mentioned study (Hoyer 2012) is the behavioral part of a project focussing on pre- and postnatal development. The data on pregnancy and embryonic development were published by Zahedi et al. 2013. No effect on pregnancy, but a very slight postnatal developmental retardation was found. Another publication from same projects (Zaun et al. 2013) shows no effect on the fertility of the offspring. | The studies have been considered and the text has been changed accordingly.                     |
| 169. Lyrae Velma, VelmaLyrae@hotmail.co.uk                 | 3.8.3. In vitro       |  | P151 29 inconsistency could be due to not giving credit to the particular frequency effect and 30   | The text has been changed for the sake of clarity.  |

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| k, United Kingdom   | studies  | <p>not segregating results of male and female which have previously been shown to have opposite effects.</p> <p>P153 29 opposite effects might also reflect reduction or increment due to other factors but wording might suggest opposition (positive, negative finds) and thereby be dismissed, whereas it shows opposite ranges of the particular pathway and could provide a useful biomarker.</p>  |   |
| 170. Bevington Michael, ElectroSensitivity UK, michael@es-uk.info, United Kingdom | 3.8.4. Conclusion on health effects from SF exposure | IEI-EMF symptoms near MRI MF are established (Shaap et al 2014; van Nierop et al 2013).   | The literature cut-off date was extended and the additional literature has been considered.   |
| 171. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom                        | 3.9.1. Human studies                                 | <p>P156 10 individual motor threshold could reveal major differences by testing EHS person's MT. 22 the effect of the pulses as experienced by EHS persons (rather than SAR measurements) are confirmed to be responsible for the measured effects &amp; could be a crucial biomarker for EHS and further could be objectively measured. 42 a possible mechanism is suggested to be the low frequency currents connected with movement which is a parameter which has been left out of testing.</p> | These are suggested hypotheses without scientific evidence. No changes in the text are required.  |
| 172. Lyrae Velma, VelmaLyrae@hotmail.co.uk, United Kingdom                        | 3.9.2. In vivo and in vitro studies                  | <p>P157 24 Opinion should note Authors can only say from the results that there was no effect on the male rat rather than rats per se as it was only male rats that were tested. P158 16 superoxide dismutase enzyme activity</p>   | <p>The text refers to the results presented by the authors. No change in the text is required.</p> <p>The SCENIHR considers that no changes</p> |



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|   |            | could be a useful biomarker or mechanism using ratios.  | in the text are required.  |
| 173. Henry Lai and Blake Levitt,<br>hlai@u.washington.edu,<br>United States | 4. OPINION | The deficiency of the SCENIHR opinion document is that it fails to do a thorough review of recent literature on non-ionizing electromagnetic fields (EMF) and biological/health effects. Only selected papers were evaluated using ambiguous criteria. This is a disservice to the public and reveals contempt for fellow scientists. Purported analyses on this scale should include as many peer-reviewed publications as are relevant. The two areas of review in the document have many more publications since 2007 than were considered. These include genetic effects for radiofrequency radiation (RFR): 114 papers (65% reported effects); and extremely -low frequency electromagnetic fields (ELF EMF): 59 papers (83% reported effects); for neurological effects: RFR: 211 papers (68% reported effects); ELF EMF: 105 papers (90% reported effects). Also, there are two important areas not thoroughly considered in the document. The first is the effects of EMF on oxidative status, a change of which disturbs all physiological functions. There are 106 RFR papers (88% reported effects) and 110 ELF EMF papers (88% reported effects) on the topic. The second is on the effects of low-intensity RFR, to which most of the human population is chronically exposed. There are many papers reporting biological/health effects from low-intensity RFR exposure. This is documented in Levitt & Lai Environ Rev 18:369- | The inclusion and exclusion criteria for scientific papers have been described in the Opinion. |

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|   |            | 395, 2010. Since the majority of the peer-reviewed literature reported effects, it is outrageous to ignore any effect of EMF exposure on human health and a crime to humanity not to recommend any action to curtail the exposure. In summary, the SCENIHR document needs a major overhaul to make it credible. The current draft should not be taken seriously by any public health official as it is grossly incomplete.   |   |
| 174. Souques Martine, EDF, martine.souques@edf.fr, France | 4. OPINION | EDF welcomes any initiative by European authorities to review the scientific state-of-the-art, including the present SCENIHR report. EDF also welcomes the process of open public consultation for issuing this report as it contributes to making the process more transparent and therefore preserves public confidence in the management of the EMF issue by European authorities. This report is a welcome update that completes and enriches the preceding report from 2009 with a nearly exhaustive review of the literature that carefully defined the selection criteria for the articles it considered. In particular, new data are introduced about the biological effects of intermediate and THz frequencies and also about exposure to these frequencies, used in an increasing number of applications. The French Society of Radioprotection (Société française de radioprotection) section on Non-Ionising Radiation devoted a day-long conference to studying this subject in 2011 (THz frequencies). Since 1999, the Council Recommendation for limiting public | This is a general comment, no change in the text is required. |







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|   |               | exposure to EMFs has proved to be a well-suited answer to the need for general-public protection. Its scientific basis has been regularly reviewed, notably by the SCENIHR in 2007 and 2009. This new report should take a position about the need to update this Council recommendation (1999/519/EC).  |  |
| 175. v GILs, Jan, NPS, jgvgils@gmail.com, Netherlands                                   | 4. OPINION    |  | Duplicate submission, please see the response to the comment 14. |
| 176. Legros Alexandre, LHRI, alegros@lawsonimaging.ca, Canada                           | 7. REFERENCES | Page 187, lines 20 to 22: Change the erroneous reference: Corbacio M, Brown S, Dubois S, Goulet D, Prato FS, Thomas AW, Legros AS, Human 21 Cognitive Performance in a 3mT power-line frequency magnetic field. J Neural TransmJ116 (2009) 257-265.<br>For:<br>Corbacio M, Brown S, Dubois S, Goulet D, Prato FS, Thomas AW, Legros AG. (2011) Human Cognitive Performance in a 3mT power-line frequency magnetic field. Bioelectromagnetics 32(8):620-633 | The references have been corrected.                              |
| 177. Toivo Tim, STUK Radiation and Nuclear Safety Authority, tim.toivo@stuk.fi, Finland | 7. REFERENCES | On page 199 row 16 text (name 3) should be Toivo: Kwon MS, Jääskeläinen SK, Toivo T, Hämäläinen H. No effects of mobile phone electromagnetic field auditory brainstem response. Bioelectromagnetics 2010b; 31: 48-18 55. On page 182 row 1 an 2 no name of article.   | The references have been corrected.                              |



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|  |               | Should be: Auvinen A, Toivo T, Tokola K. Epidemiological risk assessment of mobile phones and cancer: where can we improve?; European Journal of Cancer Prevention. Issue: Volume 15(6), December 2006, pp 516-523   |                                     |
| 178. Toivo Tim, STUK<br>Radiation and Nuclear<br>Safety Authority of<br>Finland, tim.toivo@stuk.fi,<br>Finland | 7. REFERENCES | On page 199 row 16 text (name 3) should be Toivo: Kwon MS, Jääskeläinen SK, Toivo T, Hämäläinen H. No effects of mobile phone electromagnetic field auditory brainstem response. Bioelectromagnetics 2010b; 31: 48-18 55. On page 182 row 1 an 2 no name of article. Should be:<br><br>Auvinen A, Toivo T, Tokola K. Epidemiological risk assessment of mobile phones and cancer: where can we improve?; European Journal of Cancer Prevention. Issue: Volume 15(6), December 2006, pp 516-523 | The references have been corrected. |

**Comments received via email**



| <b>SUBMISSIONS</b>  |  |  | <b>SCENIHRs Response</b>   |
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| <b>Name of individual/organisation</b>  | <b>Comment</b>   | <b>References</b>  | <b>SCENIHRs Response</b>   |
| 179. Harkin Marian,<br>European<br>Parliament,<br>marianharkin@gmail<br>.com, Ireland | <p>Pg 124, line 21 to 30</p> <p>For the case-control study in Germany you state there is a high degree of heterogeneity across studies. Surely this is a positive rather than a negative, in that it avoids repeating any systematic fault and ensures if there is any bias, it is not in the same direction. If there was a high degree of homogeneity across studies then the risk of bias is higher. It also states there is a "suggestion of publication bias". This is a very tenuous argument to use to suggest caution in the interpretation of its findings. There needs to be some evidence other than suggestion. If there is any evidence it should be stated.</p> <p>Pg 125, line 13 to 25</p> <p>In analysing meta-analysis of studies from 2000 to 2009, you say concerns remain that the association may be inflated or even entirely explained by "methodological shortcomings" of the</p> | <p>Terms of Reference</p> <p>Each SCENIHR Report should incorporate all the relevant data from previous reports in the new reports overall analysis. This is a continuum of scientific evidence and this must be analysed to give a true picture.</p> <p>Given that not all studies are included, a list of studies that were assessed and rejected as irrelevant or inadequate should be available. There is a need to ensure the same rigorous assessment of</p> | <p>The comment has been considered.</p> <p>Probability of causal link cannot be estimated but we could refer to IARC 2001 clarifying "possibly</p> |

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|  | <p>epidemiological studies. Please outline, what the specific methodological shortcomings are and why they could inflate or entirely explain the association?</p> <p>It needs to be accepted that the limitations you refer to as "Methodological shortcoming" could in fact either suppress or inflate the association and some evidence at least must be provided to show which it is.</p> <p>Pg 125, line 27 to 40</p> <p>The new generation of studies show little "methodological advancement" compared to the ones conducted before 2002. Can you outline what 'methodological advancements' are necessary in order to satisfy your concerns? It needs to be investigated what is the probability of a causal link being the true explanation give the robust association you admit to, rather than methodological shortcomings being the true explanation. Are the methodological shortcomings the same across this wide range of studies and are there any "methodological shortcomings" observed in reports which showed no association.</p> <p>General Comments</p> <p>At the public conference in Athens, in response to a question as to how many papers were needed to prove causality, the response given was that the 3R's - Robust, Reliable and Replicable were more important than the quantity of papers. Given that</p> | <p>studies with negative outcomes as with positive outcomes. From reading this Opinion this is not evident - certainly not in the commentary Rigorous assessment is necessary to ensure good scientific assessment.</p> <p>I ask the SCENIHR Committee to include the following studies:</p> <ol style="list-style-type: none"> <li>Occupational and residential exposure to electromagnetic fields and risk of brain tumors in adults: a case-control study in Gironde, France</li> </ol> <p>Isabelle Baldi, Gaelle Coureau, Anne Jaffre, Anne Gruber, Stephane Ducamp, Dorothee Provost, Pierre Lebailly, Anne Vital, Hugues Loiseau and Roger Salamon</p> <p>International Journal of Cancer: 129, 1477-1484 (2011)</p> | <p>carcinogenic" is weak evidence (=low probability) of causal link (and by this make sure "possibly carcinogenic" does not mean small risk but weak evidence).</p> <p>With regard to the suggestion of additional references we did the following:</p> <p>Reference #1 has been included.</p> <p>Reference #2 has been considered but all underlying data were included already.</p> <p>References #3-#5 have been considered but no changes in the text were necessary.</p> |
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|   | <p>on line 45 pg 125 "the association appears to be robust" and on line 45/46 "having been observed in multiple studies in different setting at different points in time" which would indicate the studies are replicable, it suggests that reliability is the main concern. SCENIHR must provide evidence of the unreliability of studies or meta-analysis to give credence to your assertion of no causal link.</p>   | <p>2. Magnetic field exposure and childhood leukaemia risk<br/>A meta-analysis based on 11, 699 cases and 13,194 controls</p> <p>3. O'Carroll MJ, Henshaw DL. 2008. Aggregating epidemiological evidence: comparing two seminal EMF reviews.<br/>Risk Analysis 28:225-234.</p> <p>4. Bio Initiative 2012: A Rationale for Biologically-based Exposure Standards for Low-Intensity Electromagnetic Radiation.<br/>Carpenter D, Sage C, (Eds).</p> |  |
| <p>180. <i>No agreement to disclose personal data</i></p> | <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center; margin: 5px;"> <br/>       BioInitiative final letter to SCENIHR .pc     </div> <div style="text-align: center; margin: 5px;"> <br/>       Exhibit A-Language.docx     </div> <div style="text-align: center; margin: 5px;"> <br/>       Exhibit C-Misreading De Iuliis.docx     </div> <div style="text-align: center; margin: 5px;"> <br/>       Exhibit D- Neuro Effects SCENIHR.doc     </div> <div style="text-align: center; margin: 5px;"> <br/>       Exhibit E- Genetic Effects SCENIHR.doc     </div> <div style="text-align: center; margin: 5px;"> <br/>       Exhibit F - Belyaev ELF + RFR SCENIHR     </div> </div> |  | <p>The references provided have been considered. Please see below.</p> |

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|  |  Exhibit B -Hardell<br>SCENIHR.doc  Exhibit<br>G-Mitochondrial Electr   |  |   |
|  | <p>This Preliminary Opinion is an inadequate basis for updating the 2009 EU opinion on 'Health Effects of Electromagnetic Fields (EMF)' and should be sent back for major revisions. The conclusions drawn from the data presented are unreliable for judging possible health risks.</p>  |  | <p>The SCENIHR considers that no changes in the text are required</p>                   |
|  | <p>The Committee has not answered the question it was appointed to investigate. There is no conclusion in the Executive Summary on whether the Committee determined that possible health effects of EMF are established for childhood leukemia and exist for genotoxicity, for neurological effects, for brain tumors, male fertility, fetal and neonatal effects or other key areas of research.</p> |  | <p>The possible health effects have been considered (comments on following points).</p> |
|  | <p>The Opinion should be revised to clearly state whether the evidence supports a finding of possible risk for each type of evidence considered (each section). (Exhibit A)</p>   |  | <p>The way how evidence is weighted is described in the Opinion.</p>                    |
|  | <p>Sections on brain tumors are flawed. The report consistently ignores or dismisses published scientific studies that report positive findings at exposure levels below ICNIRP standards (Exhibit B-Hardell)</p>   |  | <p>Comments have been considered. (See also the feedback to the comment 183).</p>       |




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|  | Further, the Opinion misreads evidence of effects of some studies it does present when drawing conclusions (Exhibit C)  |  | Comments have been considered.   |
|  | Evidence for neurological effects (Exhibit D) should be incorporated into the analysis and conclusions of the Final Opinion   |  | Comments have been considered. (See also the feedback to the comment 186)                                  |
|  | Genetic effects (damage to DNA) from radiofrequency radiation are reported in 65% (or 74 of 114 studies); and 83% (or 49 of 59 studies) of extremely-low frequency studies (Exhibit E). These studies span the 2006/2007 to 2014 time period and many are overlooked. |  | Comments have been considered. (See also the feedback to the comment 186).                                 |
|  | Evidence for Impacts of Physical and Biological Variables on Study Results (Exhibit F) The main flaw of the preliminary Opinion is in neglecting the mechanistic data on non-thermal (NT) effects of microwaves (MW).   |  | Comments have been considered.<br>A chapter on mechanism has been added.                                   |
|  | Exhibit G is about Mitochondrial Dysfunction and Disruption of Electrophysiology and could go in the mechanism session with Exhibits F  |  | Comments have been considered.<br>A chapter on mechanism has been added.                                   |
| 181. <i>Anne Silk</i>                              |  When Positives Go Negative.pdf  letter.pdf   |  | Duplicate submission, please see the answers to the replies 35, 83-86, 103.                                |
| 182. <i>No agreement to disclose personal data</i> | I wish to comment on the need to include basic cell biology studies of the cellular stress response in the SCENIHR report. Because this natural protective mechanism against a variety of harmful   |  | The inclusion and exclusion criteria have been described in the Opinion.<br><br>No changes in the text are |

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|  | <p>stimuli is present in virtually all cells, one can identify the non-ionizing radiation exposures that are potentially harmful by determining the levels at which cells start to synthesize stress proteins. In its review of relatively long term health effects of exposure to non-ionizing radiation, SCENIHR has not included cell biology studies of this natural protective mechanism. The cellular stress response protects against the immediate changes that lead to the long term health effects usually investigated. Living cells synthesize stress proteins when exposed to many different potentially harmful stimuli that include non-ionizing radiation across a wide range of frequencies. Stress protein synthesis in response to the oxidative damage to DNA stimulated by non-ionizing radiation is considered likely to lead to cancer and other diseases, and they occur at exposures well below levels that are considered safe based on the thermal criterion. A press release (dated March 24, 2014) from the US Dept. of Interior criticized the FCC and endorsed the need to correct the safety levels saying "the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."</p> <p>Given the goals of SCENIHR, analysis of these cell biology studies is essential and should be included. An EMF safety standard, based on the most relevant biological response, is far more realistic</p> |  | <p>required.</p> <p>It was decided to consider primarily original papers for the Opinion. This has been made clearer in the text in the section "3.2. Methodology".</p> <p>Research papers on stress proteins had already been included in the opinion. No change in the text is required.</p> |
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|  | <p>than the thermal criterion, and more protective as well. Two relevant papers that include references are listed. The first is attached, and the second can be found online.</p> <p>Blank M, Goodman R (2009) Electromagnetic Fields Stress Living Cells. Pathophysiology 16:71-78. Published on line, doi 10.1016/j.pathophys.2009.10.01.006</p> <p>Blank M (2012) Evidence for Stress Response (Stress Proteins). In BioInitiative Report (2012) A Scientific Perspective on Health Risk of Electromagnetic Fields. Section 7, pp. 1-39. Published Online December 31, 2012 <a href="http://www.bioinitiative.org/report/index.htm">http://www.bioinitiative.org/report/index.htm</a></p>  |  |   |
| <p>183. Lennart Hardell, MD, PhD<br/>Professor Department of Oncology<br/>University Hospital<br/>Sweden</p> | <p>We have read the SCENIHR 2013 Preliminary opinion on Potential health effects of exposure to electromagnetic fields (EMF), especially relating to epidemiological studies on neoplastic diseases. It is concluded at page 4 in the abstract that "Based on the most recent cohort and incidence time trend studies, it appears that the evidence for glioma became weaker while the possibility of an association with acoustic neuroma remains open". This statement is not based on facts but on selective inclusion of studies with omission of the most recent publications, e.g. from our research group (the Hardell group). Our studies were well known to the Expert group since Dr Kjell Hansson Mild was one of these experts and also a co-author in most of the Hardell group studies. In summary, the preliminary SCENIHR conclusion</p> |  | <p>All references were considered in the Opinion.</p> |

that glioma risk is weaker now is not scientifically justified. The only way that conclusion could be reached by SCENIHR is to exclude critical studies that present evidence to the contrary, i.e. studies that report the risk of glioma (and acoustic neuroma) is stronger now than in 2009. Including our studies would give different conclusions supported by critical review of the limitations in cohort studies and incidence data. The Preliminary Opinion should be sent back to the Committee for new evaluation of the scientific data, and should integrate the results of these published data. Our full discussion is found in the included pdf. We expect our submission to be seriously considered causing re-evaluation of the conclusions in SCENIHR 2013.

About references:  
Here are the articles from 2013 that must be included in SCENIHR.  
These are the only studies with 20+ use of mobile phones and the risk of brain tumours. To ignore these studies well known to the expert group is scientific fraud.  
One of the experts Kjell Hansson Mild, also co-writer of these studies, informed Schuz and others about these publications but could not get them included in the report.  
Why delete such new important results?  
According to my view the report needs to be sent back for new evaluation of the data, the expert group might even be changed because they have

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|   | not been able to fulfill their job.  |  |  |
| 184. <i>No agreement to disclose personal data</i>  | <br>WIFI-aThalidomideint<br>hemaking-whocares.ç   |  | The inclusion and exclusion criteria have been described in the Opinion.<br>No changes in the text are required. |
| 185. Peter Nayström<br>Environmental Manager<br>peter.naystrom@swe<br>rea.se<br>Swerea,<br>SWECAST/Swedish<br>Foundry Association | Dear madam / sir<br>I have just received your report on the potential health effects of exposure to electromagnetic fields. Since I represent the foundry industry in Sweden, I read the lines around inductions furnaces with great interest. (Page 36 lines 1-7) I am also responsible for the EMF issue for the European Foundry Association, Commission 2 (Environment and Work environment)<br>I note that you use the reference values set in a completely different level than the action levels contained in the EMF directive from 2013.<br>Is this a mistake or is there some other explanation for the extremely low values quoted in the report? |  | Duplicate submission, please see the answer to the reply 53.   |
| 186. <i>No agreement to disclose personal data</i>  | Comments on the SCENIHR preliminary opinion on 'Potential health effects of exposure to electromagnetic fields (EMF) approved at the 4th plenary of 12 December 2013<br>We hereby submit, enclosed, our comments from Swedish Radiation Protection Foundation, a non-profit organization with the aim of informing and   |  | The literature cut-off date was extended and the additional literature has been considered.                      |

protecting citizens from health hazards of EMF.  
Our comment focus mainly on the content of the SCENIHR 2013 report on "Health Effects from RF-fields (chapter 3.5 )  
Summary  
This section of the SCENIHR preliminary opinion provide false, inaccurate, misleading and biased information about available research and results from both epidemiological studies on neoplastic diseases (cancer) and studies on other health risks. There is even evidence of scientific fraud or misconduct. We hereby expose why:  
A. Fraudulent and misleading presentation of what studies on brain tumour risks in children, adolescents and adults show;  
B. Omission of critical new studies providing evidence of increased risks of malignant brain tumours from mobile phone use;  
C. Omission of critical statistical data over increasing trends in brain tumour incidence in some countries;  
D. Omission and biased presentation of studies showing increased cancer risks from base stations;  
E. Serious omissions of results of studies showing negative effects and health risks from RF-EMF radiation: 144 of 211 new neurological studies show neurological effects (68%) and 90% of 105 studies show neurological effects of low frequency EMF. These data show that neurological effects from RF-EMF are clearly established, and

not the contrary as proposed by the SCENIHR report. Also Damage to DNA from RF-radiation are reported in 65% of (74 of 114 studies) and in 83% (49 of 59 studies) during the 2006/2007 to 2014 period and many of them are overlooked by the SCENIHR report. They also show that damage to DNA is sufficiently established as a cause of RF-EMF also in contrast to what is proposed in the SCENIHR preliminary opinion. The preliminary opinion needs to be totally revised and submitted to a new group of experts that are prone to and capable of presenting an objective and accurate report of the results from the research on health risks from high frequency radiation from wireless technology and techniques emitting low frequency radiation. The available preliminary opinion of SCENIHR is a disservice and a betrayal to the people of the European Union.



SCENIHR comment  
Swerad 16 April 2014