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European Commission
DG Health and Food Safety
Directorate C: Public Health
Unit C2 – Health information and Scientific Committees
Office: HTC 03/073 L-2920 Luxembourg

Attention: Mr. John Ryan
Subject: Joint Comment by the BioInitiative Working Group,
and ECERI on the SCENIHR Final Opinion on EMF
and Publication in the Bioelectromagnetics Journal

Please find attached our recent peer-reviewed publication in Bioelectromagnetics authored by Cindy Sage, David O. Carpenter and Lennart Hardell.

As stated in this publication, we continue to believe that the Final SCENIHR Opinion on EMF does not meet the stated objectives of the review, and should be set aside as an inadequate Committee effort.

The evidence in the SCENIHR Final Opinion on EMF clearly and convincingly establishes the potential for health effects of exposure to electromagnetic fields (EMF). Based on the evidence provided in this Opinion, the Committee is obligated to draw to the attention of the Commission that EMF is a '*new and emerging problem that may pose an actual or potential threat*'.

Respectfully submitted,

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ECERI is an international non-profit organization created in Belgium, by Royal Decree, 18th of May 2011 and advises EU member states on cancer and disease prevention. ECERI programs study environmental causes of cancer, and genetic and epigenetic mechanisms related to cancer and other environmental diseases. ECERI promotes multidisciplinary research in the fields of environmental medicine and disease prevention, and supports collaborations of trans-national public and private organizations to achieve direct societal improvements in health care.



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Comment

Comment on SCENIHR: Opinion on Potential Health Effects of Exposure to Electromagnetic Fields, Bioelectromagnetics 36:480–484 (2015)

We write to comment on a Letter to the Editor from The Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) summarizing conclusions of its 2015 science review on electromagnetic fields (EMF) [SCENIHR, 2015a]. SCENIHR's latest review was directed by the European Commission to update its previous 2009 scientific review and offering conclusions on the existence of potential health effects of EMF.

In January of 2015, the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) published its final opinion on "(P)otential health effects of exposure to electromagnetic fields. The purpose of this document was to update previous SCENIHR opinions in the light of recently available information since then, and to give special consideration to areas that had not been dealt with in the previous opinions or in which important knowledge gaps had been identified" [SCENIHR, 2015b].

We offer comments here summarizing problems with the SCENIHR review process and faulty derivation of many of the Committee's overall conclusions. SCENIHR has not answered the question it was appointed to investigate. The Committee has answered a different question, limiting its conclusions to whether certainty or causal effect is established, instead of possibility of health risks. The title, "Opinion on Potential Health Effects of Electromagnetic Fields," clearly indicates the review should be judging whether potential exists, not certainty of health harm. SCENIHR has used the wrong test by requiring absolute proof and mechanistic evidence of potential EMF effects. The embedded up-shifting language instead requires demonstration of "conclusive or unequivocal evidence" [BioInitiative Working Group, 2014, 2015; SCENIHR, 2015a]. As a result, even where the report documents good quality, peer-reviewed study evidence for potential risk, these data are simply dismissed. Short of a finding of causal evidence, it appears the SCENIHR review process will not label any evidence as having potential health

effects. The review as written would be better titled "Opinion on Scientific Certainty of Health Harm from Electromagnetic Fields." SCENIHR Committee's own name establishes that its purpose is to investigate emerging and newly identified health risks, not only those conclusively proven.

Interaction Mechanisms

Genetic damage via oxidative stress leads indirectly to single- and double-strand DNA damage at non-thermal levels. There are dozens of peer-reviewed publications that provide convincing evidence of oxidative stress from extremely low frequency EMF (ELF-EMF) and radiofrequency (RF). Furthermore, there is virtually no mention of epigenetic changes to DNA that can account for at least some adverse health effects of ELF and pulsed RF. The emerging science of epigenetics establishes a plausible mechanism to account for significant disturbances and damage in living tissues caused by ELF-EMF and pulsed RF produced by wireless technologies. Epigenetics refers to transient heritable changes in gene expression that do not involve changes to underlying nuclear acid sequence. DNA methylation, chromatin remodeling, histone modification, and non-coding ribonucleic acid (ncRNA) are currently considered to maintain epigenetic variations in response to environmental changes. It is often heard from traditional scientific thinkers that EMF and RF do not have sufficient energy to break chemical bonds, thus cannot be a cause of cancer, but

Conflicts of interest: None.

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both oxidative stress and epigenetic changes provide mechanisms that can lead to cancer and other diseases. The role of epigenetics is already linked to a variety of human disorders and fatal diseases.

Health Effects From THz Fields

Citing expected increase in use of terahertz (THz) fields, SCENIHR should be citing the few studies reporting biological effects that could reasonably be presumed to lead to adverse health effects with long-term exposure, especially noting the presence of theoretical mechanisms for observed damage. This is a special failure to identify “an emerging and newly identified possible health risk” area.

Health Effects From RF Fields

Brain tumors. The report consistently ignores or dismisses published scientific studies that report positive findings at exposure levels below public safety standards [BioInitiative Working Group, 2014, 2015; SCENIHR, 2015a]. There is a consistent pattern of increased risk for glioma (malignant brain tumor) and acoustic neuroma with use of mobile and cordless phones. A finding of “possible effect” is clearly demonstrated, even though complete understanding of mechanisms responsible is not certain.

Brain activities. The letter fails to note a “possible effect” where there is clear evidence presented by SCENIHR that pulsed RF affects electroencephalogram (EEG), sleep structure and duration, evoked potentials, and brainwave activity. Pulsed RF effects on cognition are documented, however, no finding of “possible effect” is derived. That there is not 100% consistency in studies, where many studies report such effects is expected, and simply points to differing study and subject conditions that do not invalidate inescapable evidence for “possible effects” at levels far below safety limits.

Electrohypersensitivity (EHS). It is wrong to apply an either-or test to provocation studies on EHS. SCENIHR concludes there is no “causal evidence,” but this is the wrong test to apply in judging “possible effect” as the Committee was instructed.

Neurological diseases. The sheer volume of studies on neurological effects refutes the statement “human studies show no clear effect, but evidence is limited.” Neurological/behavioral effects of ELF-EMF and radiofrequency radiation (RFR) were dismissed as “not firmly identified.” We have documented a significant number of studies of ELF radiation reported to cause nervous system effects in 90% of the 105 studies available from 2007 to 2014

[BioInitiative Working Group, 2014; SCENIHR, 2015a]. New neurological RFR studies report effects in 68% of studies on RF radiation (or 144 of 211 studies) in 2014. This has increased from 63% in 2012 (93 of 150 studies). Neurological health effects resulting from non-thermal ELF and RF exposures are clearly documented. Another fundamental flaw is in neglecting many studies showing dependence of non-thermal microwave effects on exposure duration or dose (defined in radiation physics as multiplication of SAR on exposure duration) [BioInitiative Working Group, 2014; SCENIHR, 2015a].

Reproduction and development. SCENIHR concludes that inclusion of new studies of pulsed RF on male fertility at non-thermal levels provide weak evidence only. Their analysis misreads evidence of effects of some studies when drawing conclusions [BioInitiative Working Group, 2014; SCENIHR, 2015a]. In one example, statistically significant damage to sperm DNA and sperm motility and vitality was reported at cell phone radiation exposure of only 1 W/kg, which is a common cell phone exposure [De Iuliis et al., 2009]. De Iuliis et al. say “the range of SAR values over which the consequences of RF-EMR radiation were examined (0.4–27.5 W/kg) include the values covered by conventional mobile phones (0.5–1.5 W/kg),” and “significant reductions in vitality were observed at exposure levels as low as 1.0 W/kg (p. 0.01).” SCENIHR misreports it as “(T)he authors claimed that their results clearly demonstrated that RF exposure can damage sperm function via mechanisms involving the leakage of electrons from the mitochondria and the induction of oxidative stress but the employed SAR values are very high and not relevant to cell phone users.” Finally, the entire body of new evidence for risks to fertility and reproduction is dismissed.

SCENIHR conclusions dismissing possible health risks are possible only by omitting key data, ignoring data and conclusions of authors, and dismantling the significance of the De Iuliis et al. results by misreporting it.

Health effects from ELF fields genetic effects (damage to DNA) from ELF-EMF are reported 83% (or 49 of 59 studies) of ELF studies [BioInitiative Working Group, 2014; SCENIHR, 2015a]. These studies span the 2006/2007 to 2014 period and many are overlooked. Childhood leukemia studies continue to support increased risk at 0.3 to 0.4 uT as SCENIHR points out, but then disregards on the basis of “no mechanism,” ignoring evidence for oxidative stress and epigenetic changes to DNA as reasonable mechanistic explanations. This clearly violates the cardinal Bradford Hill rule that no mechanism is required

for a finding of causal evidence, given plausible mechanism(s) exist and other key indicators are present. SCENIHR simply cannot hold this view in light of existing science and public health knowledge and practice.

Health Effects From Combined Exposure to Environmental Stressors

SCENIHR dismisses meta-analyses showing at least 65 individual studies that report synergistic damage from combined exposures of ELF/RF and toxic chemicals. This is more than sufficient evidence to warrant a finding of “possible effect,” in line with the directive to this Committee [BioInitiative Working Group, 2014; SCENIHR, 2015a]. Overall, SCENIHR has not conducted a scientific review process for judging possible health risks. This results in erroneous and deceptive conclusions by failing to conclude such possible health risks do exist. Evidence that SCENIHR has presented clearly and conclusively demonstrates that EMF health risks are possible, and in some cases are established. The Committee is obligated to draw to the attention of the European Commission that EMF is a new and emerging problem that may pose an actual or potential threat.

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