

*THE WORLD HEALTH ORGANISATION (WHO)
DRAFT ENVIRONMENTAL HEALTH CRITERIA (EHC)
ON RADIO FREQUENCY (RF)*

**Some comments on the failure of the WHO EHC-RF draft
to deal appropriately with
Electromagnetic sensitivity (ES)
and Electromagnetic hyper-sensitivity (EHS)**

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- People with electromagnetic sensitivity (ES) and electromagnetic hyper-sensitivity (EHS) are particularly affected by this WHO EHC review, so its major inadequacies and errors need to be addressed fully to safeguard a rapidly growing part of the world population.
- This WHO EHC draft was published in part on 1st October 2014, with partial evidence and no conclusions. Studies were included to the end of 2012 and some to 2013. Comments were required by 15th December 2014.
- The following are some general comments. Few specific details have been noted since people are asked not to "quote or cite" the draft.

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(a) ES symptoms: “adverse health effect” and “functional impairment” accepted

The symptoms of electro-sensitivity (ES and EHS) are now accepted as caused by EM exposure according to the WHO’s ICNIRP.¹ These ES and EHS symptoms clearly fall within the WHO’s definition of an “adverse health effect” as defined by the WHO’s EMF Project and are not by definition simply transient or necessarily related to an organic illness: “Annoyance or discomforts caused by EMF exposure may not be pathological per se, but, if substantiated, can affect the physical and mental well-being of a person and the resultant effect may be considered as an adverse health effect. A health effect is thus defined as a biological effect that is detrimental to health or well-being. According to the WHO Constitution, health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” (WHO EMF Programme: Framework for Developing EMF Standards, 2003).

This fits with similar definitions of electro-sensitivity symptoms and functional impairment: “An adverse effect is a biological effect characterized by a harmful change in health. For example, such changes can include ... impaired mental function, behavioral disfunction, reduced longevity ... An adverse effects exposure level is the condition or set of conditions under which an electric, magnetic or electromagnetic field has an adverse effect” (D’Andrea et al, 2003, based on SC-4 IEEE C.95) and “If an effect is of such an intense nature that it compromises the individual’s ability to function properly or overcomes the recovery capability of the individual, then the ‘effect’ may be considered a hazard” (Michaelson, Lin, 1987).

Thus electro-sensitivity symptoms are clearly accepted by the WHO and others as functional impairments and adverse health effects to be prevented by appropriate public health safety limits. The WHO’s EHC review should start by recognising these established principles so that the widespread evidence of adverse health effects and functional impairments caused by EM exposure can be used in determining the appropriate non-thermal safety limits.

(b) Non-thermal adverse health effects already accepted by parts of the WHO

Since parts of the WHO already accept non-thermal adverse health effects and functional impairment as caused by EM exposure (ICNIRP and IARC), the established and convincing evidence for non-thermal effects should be highlighted and given priority in this WHO EHC review. The rest of the review should follow from this.

(c) Inadequate understanding of established pathophysiology of ES and EHS

The author(s) of this draft review clearly lack appropriate understanding of what has been established in the pathophysiology of both electromagnetic sensitivity (ES) and

electromagnetic-hypersensitivity (EHS) since ES was first recorded in the modern scientific literature in 1781 and EHS in 1932. Most aspects of the condition were established over 50 years ago and it was classified and named by the mid-1960s in published scientific and medical literature, leading to WHO conferences about non-thermal effects from the 1970s.

Instead, the author(s) confine many of their observations to the different condition of a fear of electromagnetic exposure, a placebo psychological explanation allegedly promulgated by the WHO's EMF Project in 2004 essentially to protect the wireless industry, although the physiological condition of actual sensitivity had already been convincingly established in the 1960s and was later given an ICD-10 classification and recognized in national legislation as a functional impairment caused by EM exposure; indeed, this psychological fiction was contrary to the WHO's ICNIRP's own earlier acceptance of physical EM sensitivity at non-thermal levels in 2002. All the assessments in the section on human effects are therefore invalid medically if they are supposed to refer to actual physical sensitivity to EM exposure, as opposed to a psychological fear of EM exposure. Animal, plant and children studies on the latter psychological condition are not given and presumably do not exist, whereas there is a sizeable corpus of literature which provides convincing and consistent long-established evidence for the physical condition of physical sensitivity to EM exposure. This includes Aurora sensitivity, geomagnetic sensitivity, with studies showing increased strokes related to geomagnetic effects, electronic warfare at non-thermal levels since the 1950s and now common non-thermal therapeutic interventions. The whole of this section of the draft review, therefore, needs substantial revision to bring it into line with the majority medical scientific evidence and should start from the established conditions of both electromagnetic sensitivity (ES) and electromagnetic-hypersensitivity (EHS).

(d) Inadequate understanding of the difference between Electromagnetic sensitivity (ES) and Electromagnetic hyper-sensitivity (EHS)

The draft report lacks sufficient specific references to the differences between electromagnetic sensitivity (ES) and electromagnetic-hypersensitivity (EHS). Many studies proclaiming to test one condition actually tested the other. Few studies have addressed screening all subjects to find those who are sensitive to EM exposure before testing, or have tried to define those who are electromagnetically sensitive (ES) as opposed to those who have electromagnetic hyper-sensitivity (EHS). This deprives the draft of credibility in this area and it should be re-written by a medical expert who has diagnosed and treated people with differing levels of sensitivity both at objective and subjective levels.

(e) False assumption by minority heating-only clique

By the 1950s some countries involved with the WHO were adopting non-thermal safety limits and already about 41% of the world population has rejected the WHO/ICNIRP obsolete heating limits and adopted biological limits to safeguard long-term and low-level exposure. Even a WHO/ICNIRP survey of 2014 revealed that 58% of countries advise their populations to adopt safety measures for RF radiation to protect against known non-thermal effects. The means that this WHO EHC draft, apparently written by a minority 'heating-only' clique, still rejects the majority scientific view and is therefore fatally invalidated because of its false assumption. Interestingly, this pro-wireless denial of the established non-thermal effects has also been required of employees of some pro-wireless mobile phone manufacturers and pro-wireless government health departments, despite the same governments using non-thermal electronic warfare and non-thermal therapeutic interventions, and the WHO's IARC and ICNIRP long accepting non-thermal adverse health effects. To continue to reject established non-thermal effects is not scientific, but an invalid minority belief for political or economic reasons.

(f) Not peer-reviewed

The crisis in European science generated by the deliberate omission of key studies by the SCENIHR 2014 draft opinion shows how outdated and pointless are reviews by like-minded cliques which are not representative of majority scientific attitudes and are not peer-reviewed. This WHO EHC will be equally pointless unless radically corrected.

(g) Draft evidence unfinished and no draft conclusions

It is odd to ask for consultation when the published draft has chapters missing and has no draft conclusions.

(h) Final conclusion stated by ICNIRP member

It is also odd to ask for consultation when the conclusion, seemingly not yet written, has in fact already been decided. ICNIRP's Croft stated in 2014 that the EHC draft's conclusion is or will be at its publication in 2016: "No evidence of health effects". This suggests a pro-wireless minority viewpoint typical of some elements of ICNIRP and the EMF Project. It would be against the clear majority scientific viewpoint.

(i) 16 specific observations

1. Electrosensitivity physical symptoms are now clearly established scientifically and admitted even by the WHO's ICNIRP as caused by EM exposure, not fear. Therefore the whole draft should be re-written to start from that recognition; it needs to be changed fundamentally and is pointless if this fails to be done, since it will not reflect the current state of the majority medical science.
2. The draft fails to recognise that it is has been established for over two decades that electrosensitivity is non-linear, with windows of effects, thus invalidating conscious provocation tests designed on the refuted linear hypothesis.
3. The draft fails to recognise that it is has been established for over two decades that electrosensitivity is individual (idiopathic), like most similar biological health effects, thus invalidating conscious provocation tests designed on the refuted universal or common reaction hypothesis.
4. The draft fails to recognise that it is has been established for over a decade that immediate conscious subjective symptoms of sensitivity to electromagnetic exposure, as opposed to subconscious objective markers, are not necessarily correlated with exposure, just as with other environmental toxins and allergens such as ionising radiation, chemical exposure, hayfever allergens or food intolerance, thus invalidating conscious provocation tests designed on the refuted hypothesis of only immediate conscious subjective symptoms.
5. There does not seem to be a distinct chapter on sensitivity related to the convincingly established DNA effects, epigenetic effects, genetic haplotypes, WiFi sensitivity, MRI sensitivity, therapeutic sensitivity, Aurora sensitivity and geomagnetic sensitivity including stroke effects, now essential to understanding ES and EHS effects.
6. The draft lacks scientific credibility by excising a proper historical framework for referencing and informing recent studies, especially given the completely insufficient attempts to assess ES and EHS in previous WHO publications. There is no scientific logic in limiting a review to 5 years. Thus the review should include where necessary references to older studies never properly reviewed previously by WHO/ICNIRP (eg Bergman W, *The Effects of Microwaves on the Central Nervous System*, 1965),² which leading experts outside of the WHO regard as sufficient and convincing evidence in their own right for convincingly and consistently establishing ES and EHS as pathophysiological conditions some 50 years ago.
7. Most chapters seem to assume that only the invalidated hypothesis of SAR is relevant, whereas modern medical science regards it as irrelevant ("garbage and

and unforgiveable”, according to an IEEE member at the November ICNIRP conference) in dealing with the established non-thermal effects. The review should be re-written to start from this acceptance that SAR and heating effects are now regarded as irrelevant to low-level and long-term exposure. Instead the review should focus on the current ways of assessing evidence for health effects, such as DNA damage, oxidative stress, cellular apoptosis, epigenetic changes, protein expression, etc.

8. There is no recognition that most common sources of EM exposure are a mixture of both ELF and RF, e.g. mobile phones, cordless phones, WiFi, and Bluetooth. This factor undermines the WHO’s artificial division into RF and ELF. To have any credibility for the modern world the review should cover all non-ionising EM exposure, since there is no scientific logic in limiting a review to a narrow frequency range when the relevant devices cover the whole frequency range. Even powerlines now carry high frequency transients and are as much RF as ELF, while WiFi’s damaging health effects may be as much its 10Hz signal, and mobiles their 273Hz signal, as their microwave carriers, in some living organisms or parts of the human body which react differently to different frequencies.
9. The review needs to explain its attitude to precautionary principles. Precautionary principles are already enshrined in many national laws, and the WHO should include such advice specifically for the benefit of countries which have adopted precautionary principles, as well as for those which have not yet done so. Precautionary principles are inherent in EM exposure reviews, since the WHO and ICNIRP safety limits were designed according to the invalidated SAR heating-only hypothesis and WHO/ICNIRP now admit that different sections of the population react in different degrees to similar low-level long-term EM exposure, and these differing reactions are dependent on idiopathic and genetic differences, co-exposures from other toxins and cumulative effects which no government can determine in advance. Precaution in such a key area of public health is therefore essential and should be the main theme of any review of EM exposure evidence, wherever any positive findings have been published.
10. There is no discussion on which studies to exclude on grounds of funding or author bias. To apply the Italian court’s principles, studies financed in part directly or indirectly by pro-wireless or pro-electric industries or governments or written by people employed by these industries or governments should be excluded as inherently or subconsciously biased in favour of such industries or governments.
11. A new methodology section should include studies analyzing bias in results in EM health studies correlated with funding.

12. The names and existing attitudes of the authors of each section of this draft should be included. This would include attitudes to non-linear effects, idiopathic effects, non-thermal effects, the number of positive findings needed to invalidate a larger number of negative findings, and the requirements for regarding an effect to be established or convincing or consistent. Without such an analysis, the review lacks scientific authority.
13. A list of authors should be included with their expertise. There is no evidence, for instance, of authors who are medical practitioners who regularly diagnose and treat people with ES. Such experts are essential for the specifically ES sections.
14. The review should explain explicitly its attitude to risk and cost benefit, since this underlies the conclusions of some papers. Some statements by WHO employees suggest that they, and thus presumably this review, put cost before health, rather than following the goals under which the WHO was established (Article 1): "the attainment by all people of the highest possible level of health", recognized as "one of the fundamental rights of every human being". It is counter-productive to have a "health" organization which assesses studies according to supposed economic factors. It should start from and remain with purely health factors. It is for politicians, and thus the people they represent democratically, to decide on whether the health precautions are worth the financial costs or costs to the wireless and electrical industries.
15. The exclusion of studies in certain languages is odd for a 'world' organisation.
16. A few details:
 - (a) Ch.5, p.102: Rubin 2006 is specifically quoted as 'good evidence', although in the 'sham' mode the phones emitted relatively high levels of EM exposure according to EM measurements, and the room was not EM hygienic; this study was therefore invalidated from the start and thus, as methodologically flawed, should not be included, nor pooled analyses which rely on it.
 - (b) Ch.5, p.30: four studies are specifically excluded (Al-Khlairwi & Meo 2004, Navarro et al 2003, Santini et al 2002, 2003).
 - (c) Ch.8, p.1: admits that all the suspected neurodegenerative diseases (Alzheimer's, PD, ALS, HD) are related to oxidative damage, which is now well established as caused by RF, like sub-mechanisms such as VGCCs, while ES and EHS are now regarded as pre-Alzheimer's and pre-cancer conditions. This neurodegenerative effect, of oxidative damage, therefore, which is non-thermal, is so fundamental that it should be put as the first chapter, with an explanation of its significant implications for public health damage; the rest of the chapters of the review could then follow as an appendix.

- (d) Ch.9 on cardiovascular effects includes Havas 2010 and Trottier L & Kofsky H 2010 critique (not a recognized journal?), but not Havas 2013 replication.

Conclusion

Fundamental inadequacy of the draft WHO EHC review

The WHO EHC draft has fundamental conceptual, historical, scientific, medical and methodological errors and fallacies in principle, overview, background and detail as listed in the points above. Without the names of specific authors and details of their medical experience in diagnosing and treating people harmed by non-thermal EM exposure, their research into molecular sensitivity to EM exposure, their attitude to established non-thermal effects, their attitude to the relationship between positive and negative findings, and an analysis of funding for the studies quoted, the draft review lacks objective scientific merit. Without peer review it lacks authority. At this stage its pro-wireless assumptions and minority thermal-only hypothesis compare unfavourably with the greater medical and scientific balance apparent in the IARC and Bioinitiative reviews by 29-30 mainly unaffiliated and independent scientists. The WHO EHC pro-wireless assumptions have persuaded experts like Prof. Leszczynski "that EHC-RF does not recognize the existence of non-thermal mechanism of RF exposures. Sarcastically, at this conclusion, the whole EHC process could be ended" (on ch.4, lines 548-9, BRHP, 6th October 2014).

¹ Several recent ICNIRP publications, like the vast majority of current medical studies, accept physical electro-sensitivity symptoms from non-thermal electromagnetic exposure (eg. ICNIRP, *Health Physics*, 2010, Ziegelberger G ICNIRP, *Health Physics*, 2014) as do explanations of ICNIRP limits (eg Swanson J, *J Radiol Prot.*, 2013), while the European Commission [Directive 2013/35/EU-EMF](#) requires employers to report electro-sensitivity symptoms from non-thermal electromagnetic exposure. Recent studies show that workers who experience electro-sensitivity symptoms from electromagnetic exposure do so according to a pattern which is common in the general population from environmental exposures, suggesting a similar incidence of sensitivity (Schaap K et al, *Occup Environ Med.*, 2014). A similar variety in levels of sensitivity is apparent in human sensitivity to electrical or geomagnetic storms established in a raised incidence of stroke (Feigin VL et al, *Stroke Am Heart Assoc.*, 2014). This variety in sensitivity shown by differing levels of symptoms from electromagnetic exposure is also apparent in animals, such as differing enzymes reactions in cows in environmental electromagnetic exposure around mobile phone masts (Hassig M et al, *BMC Vet Res.*, 2014). The finding that 80% of base station studies show neuro-behavioural effects for humans living <500m away (Khurana VG et al, *Int J Occup Environ Health*, 2010) and the fact that female humans also react with typical electro-sensitivity symptoms near power-line frequencies (Bolte JF et al, *Environ Pollut*, 2014) and the way all modern pulse-modulated devices like WiFi and mobile phones have signals at both RF and ELF, show that it is methodologically invalid to separate evidence by frequency, modulation, amplitude or pulse shape in any review of the human effects or symptoms established as caused by electromagnetic exposure, as noted above (point (i) 8, p.6). For a brief analysis of current ICNIRP thinking on ES symptoms: [ES-UK Newsletter](#) (12(3): 26-29, 2014). See also: Bevington M: *ES & EHS: A Summary* (ISBN: 9781872072210, 2013).

² For early evidence which established physical symptoms from non-thermal electromagnetic exposure, in addition to Bergman W, [Ford Motor Company](#), 1965, see, amongst many other studies, for instance: Czerski P et al, *Medycyna Pracy*, 1964; Drogitschina EA et al, *O biologitscheskom vosdejstviu biologitscheskich polej radiotschastot*, 1964; Glaser ZR, *Naval Medical Research Institute*, Bethesda, Maryland, 1972 ([shortened version](#)); Sokolov VV et al, *JPRS*, 1973; Hecht K (review of Russian research studies 1960-95), *Umwelt Medizin Gesellschaft*, 2001.