

**ELECTROMAGNETIC-SENSITIVITY
&
ELECTROMAGNETIC-HYPERSENSITIVITY**

(also known as the Asthenic Syndrome, EMF Intolerance Syndrome, Idiopathic Environmental Intolerance – EMF, Microwave Syndrome, Radio Wave Sickness)

PROVOCATION TEST FAILURES

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Yet another flawed ES/EHS study

James Rubin, Rosa Nieto-Hernandez and Simon Wessely, of the Institute of Psychiatry at King's College, London, wrote a review article for *Bioelectromagnetics* (2010) called "Idiopathic environmental intolerance attributed to electromagnetic fields (formerly 'electromagnetic hypersensitivity'): An updated systematic review of provocation studies."

This reviewed 46 conscious psychological provocation studies with 1175 volunteers claiming EHS. Its abstract included:

"Idiopathic Environmental Intolerance attributed to electromagnetic fields (IEI-EMF; formerly 'electromagnetic hypersensitivity') is a medically unexplained illness in which subjective symptoms are reported following exposure to electrical devices ... No robust evidence could be found to support this theory. However, the studies included in the review did support the role of the placebo effect in triggering acute symptoms in IEI-EMF sufferers. ... A narrow focus by clinicians or policy makers on bioelectromagnetic mechanisms is therefore, unlikely to help IEI-EMF patients in the long-term."

People who suffer ES symptoms from electrical devices will understandably be puzzled or even angered by this Review. Its conclusions do not match their experiences and they may think "Garbage in, garbage out", or that this research is designed to ensure that the government keeps its tax revenue from mobiles, even though scientists are now arguing that the cancers and other illnesses which they cause could cost health services as much or more. The following comments aim to show why many such studies are flawed and have failed to produce anything except an anxiety about phantom or 'nocebo' effects.

1. Psychological hypotheses are counter-intuitive

ES and EHS sufferers link their ES symptoms with EMF exposure and not with hypothetical anxiety. Many psychologists seem unable to devise tests which can include this as a reality, while still allowing a psychologically postulated phantom or 'nocebo' effect. This is a flaw in the tests, not in the source of the ES symptoms or the evidence of the ES or EHS sufferer. It is not just ES and EHS sufferers who find a psychological aetiology flawed. A recent study showed that 30% of German doctors accepted an EMF cause of illness in their patients and many eminent scientists studying bio-effects of EMFs accept EHS as a growing reality, affecting in some form up to 30% of the population.

2. Lack of definition of EHS and ES

This Review fails to define an EHS or ES person clearly, or distinguish between them, or state how frequently or in what way an EHS or ES person can be identified in their reaction to an EMF source. If an EHS person does not react to EMF consciously on every occasion, the assumptions behind most studies appear invalid.

3. Lack of screening of EHS or ES volunteers

Any study aiming to test the existence of EHS or ES in comparison with controls ought to screen volunteers claiming EHS or ES and the controls, otherwise it is unclear who or what is being tested, except people's anxiety.

If the Review, like the WHO, accepts that EHS exists as a condition with a set of symptoms, but fails to identify a single person with real EHS symptoms or else identifies all the EHS volunteers and many controls as having similar symptoms, then it appears to say nothing of significance. If the condition is 'idiopathic' in the original Greek meaning of the word, it will require individual and not statistical analysis.

4. Statistical analysis and correct identification

If an ES or EHS person, either an ES/EHS volunteer or a control who happens to be ES/EHS unknowingly, identifies correctly whether an EMF source is on or off in a single blinded test, it would be consistent with that person being considered ES/EHS. If, however, there were two tests, with one correct and one wrong answer, almost all the conscious psychological studies appear to suggest that the correct answer would be either incorrect or insignificant, because of the statistical model used, rather than providing an explanation for such disparate results.

Some volunteers knew when the signal was on nearly every time during the Essex 2007 study, but these actual positive results were insignificant statistically because there was no means of identifying which volunteers were or were not ES/EHS in the final analysis. The Essex study found about 60% accuracy averaged over all supposed EHS and the expected 50% for controls, but for the analysis chosen this was insignificant and about 80% accuracy would be needed. Without inappropriate shams, the Essex supposed EHS group was about 70% accurate. Nevertheless, although some individuals scored above the necessary 80%, the chosen statistical analysis confounded them with others, masking their accurate answers or counting them as statistical anomalies.

Such methodological problems in this type of conscious psychological study invalidate the results. If the Review had defined and identified the real EHS/ES out of the 1147 unscreened volunteers, it might have been able to produce a significant conclusion. At present this has yet to be done. Of the studies I have read, only Rea in 1991 both screened the supposed EHS volunteers properly for EHS and used the particular types of EMF exposure to which they reacted

and as a result achieved the inevitable 100% accuracy.

5. Frequency of ES symptoms

Not all ES or EHS sufferers claim to experience conscious ES symptoms at every EMF exposure. This is also true of other environmental allergies. Some provocation studies, however, appear to assume EHS sufferers always do experience symptoms. A baseline assessment is essential before psychological testing begins, along with confounding factors such as the diurnal state and previous or cumulative exposures, in addition to the appropriate type of exposure. If an EHS sufferer experiences symptoms for 10% of EMF exposures, the statistical analysis needs to allow for this. This is likely to mean screening and profiling each individual sufferer over a long period of time in their own environment, rather than using inappropriate Bonferroni corrections.

6. Cumulative effects

Sham after positive exposures are invalid for cumulative effects and ES/EHS has cumulative effects according to many studies.

7. Practical difficulties for conscious psychological tests

(a) As for any environmental allergy, the base and provocation EHS levels will differ for each participant, as will the precise characteristic of the EMF exposure, and the diurnal state. The EHS sufferers most seriously affected apparently had to drop out of the Essex study because of the levels used, affecting the results by apparently up to 30%.

(b) It is difficult to ensure absence of all other radiation down to very low levels.

(c) Some sufferers may react only to a synergy of ELF, RF and MW and this can be difficult to replicate.

(d) Symptoms can depend on cumulative and chronic exposure and can be delayed, especially some muscular, digestive and cognitive problems caused by EMF exposure.

8. Related evidence

(a) Biological evidence

Psychological provocation studies could draw more on biological and physical provocation studies of EMF exposure on the human body, animals and plants. For instance the 2009 Huttunen study showed ES in spontaneous muscle movements in humans from blinded exposure to radio frequency radiation.

(b) Epidemiological evidence

Psychological provocation studies could focus on specific population groups where epidemiological evidence has already shown the biological effect of low level EMF radiation. For instance, occupational epidemiological studies show many dose-dependent cancers and neurological diseases like Alzheimer's linked with EMF.

(c) Mechanistic studies

Hundreds of studies have shown adverse effects from EMF at sub-thermal levels. The claim that there is insufficient bioelectromagnetic mechanistic evidence to allow the possibility of some conscious psychological effects is flawed.

9. Genetic markers for EHS sufferers

Illnesses apparently caused by EMFs, such as childhood leukaemia near overhead power lines, have been shown to be associated with specific genetic markers. Genetic research and epigenetic issues should be included as part of future provocation studies. It seems odd that this was not done in the KCL and Essex studies.

10. Pathological markers

Conscious psychological provocation tests are not the only way of studying ES and EHS. Pathological markers are being developed by research laboratories in France, Germany, Russia and the USA.

11. Phantom or 'nocebo' effects

The Review hypothesizes that ES could be a psychological phantom or 'nocebo' effect. This appears to muddle the three distinct conditions, ES, EHS and EMF Neurosis, established by leading researchers elsewhere. Nevertheless, if this Review is right in hypothesizing a conflation of one or more of the three conditions, it would be useful to establish experimentally whether similar environmental allergies, such as from foods, peanuts, pesticides, chemicals, cats or dust, are also the product of such phantom effects, and whether humans can experience phantom effects from varying sensitivities to other EM radiation, such as visible light and UV frequencies. It is also important to establish how far phantom or 'nocebo' effects can include the nosebleeds, nausea, skin blisters and muscle paralysis, for instance, which ES sufferers experience and whether these symptoms can be induced by the sight or thought of power lines, computers, mobile phones or any other electrical device, in

addition to sham laboratory conditions. This is clearly an important issue since the psychiatrist Professor Elaine Fox, a co-author of the Essex study, stated of EHS sufferers that "it appears that worry about mobile phones is more dangerous than the EMFs themselves" in a pamphlet of 2008 by Sense about Science, the pressure group apparently sponsored by mobile phone companies according to the charity's accounts.

12. Genetic markers for phantom or 'nocebo' symptom sufferers

If the Essex study is correct in concluding that self-assessed EHS sufferers experience phantom or 'nocebo' symptoms more than controls, then there should be genetic markers to identify this sub-group. When these markers and those for ordinary EHS have been identified, it should then be possible to distinguish this subgroup of EHS from those who experience real symptoms directly.

13. Quantum biology, quantum psychology and photons

Neither the conscious psychological provocation studies nor the Review explore the application of quantum biology, quantum psychology or photons, despite a growing literature. If quantum factors are involved, mathematical models will need revision.

14. Psychiatric factors

Although EHS was first described in medical journals in 1932 and there were many occupational studies on its nature and prevalence in the 1960s in Poland and the USSR, a psychological aetiology for EHS in the general population became common only in the 1990s. This was when mobile phone companies and their insurers were worried about health claims and wanted to allay anxiety about increasing reports of adverse health effects.

A similar attempt at a psychological explanation occurred with ME/CFS, but it was against the WHO classification of G93.3. In fact Professor Wessely of King's College Institute of Psychiatry has websites dedicated to him and his views on the Camelford water poisoning, autism and the Gulf War Syndrome as well as ME. Some websites state that he was an advisor to the Science and Media Centre, sponsored by the Wi-Fi Alliance and the Mobile Operators Association, in 2009 and the NRPB/HPA

Radiation, Risk and Society Advisory Group in 2001, and was allegedly associated with the UNUM insurance company.

A psychiatric aetiology appeals to governments and insurers because it is said that they may then refuse claims from people suffering supposedly psychiatric as opposed to organic illnesses.

It also is said to appeal to drug companies and boosts the role of psychiatrists, often through CBT. In 1993 Professor Kleinman from the US apparently predicted that in 10 years' time "the central issues in the CFS field would be social rather than medical or scientific, partly driven by the economics and funding of the disability systems in various countries" (S.1528, in FD23/4553/1 [some other parts were closed in 2008 until 2071], UK National Archives). In fact the opposite seems to have happened, and now ME is being studied as an organic illness linked in some groups with retroviruses like XMRV, just as MS, rheumatoid arthritis, polio, AIDS, stomach ulcers and diabetes apparently all started as psychiatric illnesses but are now more often regarded as organic.

15. Sensitisation factors

Professor Wessely has elsewhere described possible ES symptoms from WiFi as "fatigue and malaise" ("When and Why do Doctors Collude with Patients?" published as part of the UNUM Insurance Company's chief medical officer's report of 2007 - "No sooner did Panorama identify Wi-Fi as one more cause of fatigue and malaise, a raft of Wi-Fi 'protection devices' sprang into being"). How WiFi produces "fatigue and malaise" is significant, since these symptoms are not always transient; WiFi can also sensitise someone to EMFs generally.

This aspect of sensitisation history is missing from some provocation studies. It would benefit provocation research into ES, especially if based on genetic and pathological investigations as well as subjective tests.

16. Two logical problems with the word 'idiopathic'

The suggested use of the word 'idiopathic' for EHS appears logically flawed, for two reasons. Firstly, the word 'idiopathic' comes from the roots of two Greek words, 'idios' meaning 'one's own', hence 'special' or 'particular', as in 'idiomatic' or 'idiosyncratic',

and 'pathos' meaning 'suffering'. All illness is logically 'idiopathic' or 'one's own suffering' by definition, unless it is forced on the body externally. EMF pollution is, by definition, an external force.

Secondly, some medical dictionaries give the word 'idiopathic' a precise but inaccurate meaning, as 'without a known cause'. This then begs the answer as to what causes EHS. If EMFs are the cause of EHS, then both uses of 'idiopathic' are wrong by definition; if the cause of ES symptoms is psychological, then the second 'medical' use is wrong by definition and the first is pointless. Some 18 or more names have been given to EHS in the scientific literature but 'IEI-EMF' is one of the least precise or meaningful.

17. Already out-dated

This Review will be out of date before its publication in 2010. The Review examined articles published up to November 2008, and itself appeared online in August 2009. Five studies published in late 2008 and 2009, however, seem to invalidate the Review's psychological hypothesis for EMF sensitivity. Huttunen's evidence for spontaneous hand movements in blinded tests from radio and TV signals, if accurate, would be convincing proof of conscious human sensitivity to EMFs. Myong's review of studies linking brain tumours with mobile phone usage has shown a convincing pattern of higher risk for young heavy users, again suggesting proof of adverse health effects at apparently sub-thermal levels, as did Huss's study of 4.7 million people, which found a dose-response incidence of Alzheimer's near power lines.

Yang's study of childhood leukaemia incidences near power lines found a strong association with genetic markers. Finally, Kowall's survey of German doctors found that between 29% and 58% associated EMF with health complaints. Indeed, given the hundreds of other studies on sub-thermal radiation showing adverse health effects and human sensitivities to EMFs at cellular levels, to hypothesise from flawed psychological tests that there can be no other cause for such sensitivity except a psychological phantom effect appears out-dated and lacks medical credibility. Any supposed secondary phantom effect can be investigated properly only once the primary genetic and causal mechanisms for ES and EHS are established.