

# Individual sensitivity to electromagnetic fields: Biochemical studies are the only reasonable way forward

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Humans are electric beings and human physiology depends on the flow of electric charges. When *electric* human is placed in an electromagnetic field (EMF), of sufficient strength, normal physiology can be altered through the alteration of the behavior of electric charges inside human cells, tissues and organs. Safety guidelines specify what strength of EMF should be safe for human health. However, as with any chemical or physical, including radiation, factor present in human environment, there always exists a sub-population of persons being more sensitive than the overall population, whose physiology and health might be affected by exposures complying with the current safety guidelines. Logically, even though the scientifically reliable proof is still elusive, part of the population is sensitive to the radiation emitted by the wireless communication devices and networks (RF-EMF).

Currently, research examining sensitivity to RF-EMF focuses on the so-called electromagnetic hyper-sensitivity (EHS), also called idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF). The prevailing mode of EHS research are provocation studies where exposed volunteers are asked questions about their feelings during exposure and whether they recognize when the RF-EMF exposure is on or off (do they feel RF-EMF?). There are several major problems with this type of studies, including the problematic trust-relationship between volunteers and scientists. In the end, no matter how *nicely* the scientists will deal with the volunteers from the EHS community, if the outcome of the study will indicate no link between EHS and EMF, of what EHS sufferers are already certain, the EHS community will likely not accept the result of the provocation study. Also, no matter how the data in provocation project will be collected, it will be, as always, a subjective data, *feelings* data. Hence, it will be scientifically unreliable data as *feelings* may vary dramatically between individuals. Current trend of perpetuation of the provocation studies, where scientists have no idea whether participating volunteers are indeed EHS or whether their symptoms are unrelated to EMF exposures, will not resolve, in scientifically reliable way, the problem of whether EHS is caused by EMF exposures. Continuation of *improving* the provocation studies is like *'flogging a dead horse'* - no matter how the design of provocation studies will be improved these studies will fail because they provide unreliable subjective data, severely affected by the individuals' feelings.

Instead of provocation studies we need research of biochemical responses of human body to EMF exposures. It is a time to gather a large group of volunteers, consisting of self-declared non-EHS and EHS. Scientists should be blinded on who is who. Volunteers should be exposed to EMF and biological samples should be collected during and after exposure. Omics (proteomic, transcriptomic, metabolomic) analysis of the samples should be performed to reveal changes happening in each person, when comparing samples taken before and after the EMF exposure. Omics-detected changes should be then cross-compared amongst the volunteers to find out whether any particular proteins/genes/metabolites are affected in all/majority of volunteers. Only then, scientists should look whether the self-declared EHS persons stand out in any way. The affected proteins/genes/metabolites should be identified and physiological processes, likely numerous, they regulate should be examined in detail in exposed and unexposed volunteers. Such biochemical omics-research might not only be useful in developing diagnostic criteria for EHS/IEI-EMF but, more importantly, may reveal what other health ailments/diseases, including e.g. cancer, Alzheimer's, fertility, might be caused due to the variations in individuals' sensitivity to EMF/RF-EMF exposures.