

Electromagnetic Hypersensitivity (EHS) and Exposure to Electromagnetic Fields

What is electromagnetic hypersensitivity (EHS)?

Electromagnetic hypersensitivity or Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields (IEI-EMF) (a term preferred by World Health Organization since it is neutral as to the cause of the problem) is a condition that is reported by individuals which they attribute to exposure to some form of electromagnetic fields (EMF).

The symptoms for EHS are typically nonspecific (e.g. headache, fatigue, dizziness, sleep disturbances, lack of concentration).¹ Symptoms vary in severity, and in some individuals are severe enough to prevent the individual from carrying out normal activities in daily life.

Those affected by EHS attribute their symptoms to exposure to EMF from a variety of sources. These have included electrical "noise" generated by fluorescent lighting systems or present in household wiring, electric or magnetic fields produced by power lines or electrical appliances, and radiofrequency (RF) fields emitted by Wi-Fi, cellular telephones and cellular base stations. The EMF exposure levels that those affected by IEI-EMF consider to be the cause of their symptoms are far below U.S. and international exposure limits.

EHS lacks a clear pathologic basis and is medically unexplained. This condition has similarities to other forms of unexplained environmental intolerance such as multiple chemical sensitivities², and some experts have suggested that they may be part of the same phenomenon.³

How many people are affected by IEI-EMF?

There remains a lack of validated, mutually accepted criteria for diagnosing EHS.⁴ Estimates of the how many people are affected by this condition vary, between 1.5 to 18% of the population depending on the criteria used and how they were applied.⁵

What causes the symptoms?

A large number of studies have been conducted focused on those with EHS, particularly by European investigators. These include laboratory studies, in which EHS individuals are tested in well-controlled and blinded studies to determine whether exposure to EMF can trigger the symptoms. Other studies are observational, looking at everyday exposures and a possible link with EHS.

Comment [DJ]: Include (IEI-EMF)?

Comment [DJ]: I used IEI-EMF in this factsheet, but think we should consider using EHS only here. It becomes highly confusing mentioning both. What do you think?

IEI-EMF is also mentioned in the cited journal articles. At the same time, WHO calls it EHS.

Comment [DJ]: Insert link to RF information

¹ Baliatsas, Christos, et al. "Idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF): a systematic review of identifying criteria." *BMC Public Health* 12.1 (2012): 643.

² Frias, Álvaro. "Idiopathic environmental intolerance: A comprehensive and up-to-date review of the literature." (2015).

³ Baliatsas, Christos, et al. "Comparing non-specific physical symptoms in environmentally sensitive patients: Prevalence, duration, functional status and illness behavior." *Journal of psychosomatic research* 76.5 (2014): 405-413.

⁴ Demers, Paul, et al. "A Review of Safety Code 6 (2013): Health Canada's Safety Limits for Exposure to Radiofrequency Fields." (2014).

⁵ Baliatsas, Christos, and G. James Rubin. "Electromagnetic fields, symptoms and idiopathic environmental intolerance." *Epidemiology of electromagnetic fields*. CRC Press, 2014. 261-274.

These studies have been generally unsuccessful in linking exposure to EMF to the symptoms reported by an EHS individual. Well controlled, blinded “provocation” studies show that subjects report symptoms when they believe that they are exposed to EMF, not when they actually are exposed. Some studies have found evidence for the nocebo effect in some EHS individuals (in which sham exposures are sufficient to trigger symptoms).⁶

Comment [DJ]: I don't think folks will understand what nocebo effect is.

Can we remove this last sentence? I feel like you are saying it above.

Expert reviews through health agencies or other official bodies have consistently concluded that no clear evidence exists linking the symptoms of EHS to exposure to EMF in the environment.^{7,8}

What do health agencies conclude about IEI-EMF?

In its [fact sheet on electrical hypersensitivity](#), the World Health Organization (WHO) concluded:

“Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem... no scientific basis currently exists for a connection between EHS and exposure to EMF.”

Treatment options

The WHO fact sheet on EHS also recommended:

“Treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home.”

A few physicians consider that the symptoms are caused by actual exposure to environmental EMFs and recommend reducing the exposure of such individuals to EMF in their environments.⁹ However, in the absence of objective tests that link EHS symptoms to EMF exposure, such theories remain controversial.

There has, however, been little research, and few randomized controlled clinical trials, on the treatment of EHS. In view of the high prevalence of the condition, that remains a research need. CDC will continue to monitor this issue.

For More Information:

WHO Fact sheet on electromagnetic hypersensitivity (<http://www.who.int/peh-emf/publications/facts/fs296/en/>)

⁶ Rubin, G. James, Rosa Nieto - Hernandez, and Simon Wessely. "Idiopathic environmental intolerance attributed to electromagnetic fields (formerly 'electromagnetic hypersensitivity'): an updated systematic review of provocation studies." *Bioelectromagnetics* 31.1 (2010): 1-11.

⁷ Health Effects from Radiofrequency Electromagnetic Fields. Report of the independent Advisory Group on Non-ionising Radiation (Health Protection Agency, UK, 2012) Available on the Internet at <https://www.gov.uk/government/publications/radiofrequency-electromagnetic-fields-health-effects>

⁸ Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR Opinion on Potential health effects of exposure to electromagnetic fields (EMF), European Commission, 2015. Available on the Internet at http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf

⁹ Geniuis, Stephen J., and Christopher T. Lipp. "Electromagnetic hypersensitivity: Fact or fiction?" *Science of the Total Environment* 414 (2012): 103-112.

Demers, Paul, et al. "A Review of Safety Code 6 (2013): Health Canada's Safety Limits for Exposure to Radiofrequency Fields." (2014). (a recent review of IEI-EMF)

Electromagnetic Hypersensitivity (EHS) and Exposure to Electromagnetic Fields

What is electromagnetic hypersensitivity (EHS)?

Electromagnetic hypersensitivity or Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields (IEI-EMF) ~~(a term preferred by World Health Organization since it is neutral as to the cause of the problem)~~ is a condition that is reported by individuals which they attribute to exposure to some form of electromagnetic fields (EMF).

The symptoms ~~of for EHS are typically are~~ nonspecific (e.g. headache, fatigue, dizziness, sleep disturbances, lack of concentration).¹ Symptoms vary ~~with the individual, in severity,~~ and in some individuals are severe enough to prevent the individual from carrying out normal activities in daily life. ~~There remains a lack of validated, generally accepted criteria for diagnosing EHS and consequently no objective basis for diagnosis apart from the individual's own reports.~~²

Those affected by EHS attribute their symptoms to exposure to EMF from a variety of sources. These have included electrical "noise" generated by fluorescent lighting systems or ~~present in~~ household wiring, electric or magnetic fields produced by power lines or electrical appliances, and ~~radiofrequency~~ (RF) fields emitted by Wi-Fi, cellular telephones and cellular base stations. ~~The EMF exposure levels that those affected by IEI-EMF consider to be the cause of their symptoms are far below U.S. and international exposure limits and are typical of those commonly found in ordinary nonoccupational environments.~~

EHS lacks a clear pathologic basis and is medically unexplained. This condition has similarities to other forms of unexplained environmental intolerance such as multiple chemical sensitivities³, and some experts have suggested that they may be part of the same phenomenon.⁴

How many people are affected by IEI-EMF?

~~There remains a lack of validated, mutually accepted criteria for diagnosing EHS.~~⁵ Estimates of the how many people are affected by this condition vary, between 1.5 to 18% of the population depending on the criteria used and how they ~~are were~~ applied.⁶

What causes the symptoms?

¹ Baliatsas, Christos, et al. "Idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF): a systematic review of identifying criteria." BMC Public Health 12.1 (2012): 643.

² Demers, Paul, et al. "A Review of Safety Code 6 (2013): Health Canada's Safety Limits for Exposure to Radiofrequency Fields." (2014).

³ Frias, Álvaro. "Idiopathic environmental intolerance: A comprehensive and up-to-date review of the literature." (2015).

⁴ Baliatsas, Christos, et al. "Comparing non-specific physical symptoms in environmentally sensitive patients: Prevalence, duration, functional status and illness behavior." Journal of psychosomatic research 76.5 (2014): 405-413.

⁵ Demers, Paul, et al. "A Review of Safety Code 6 (2013): Health Canada's Safety Limits for Exposure to Radiofrequency Fields." (2014).

⁶ Baliatsas, Christos, and G. James Rubin. "Electromagnetic fields, symptoms and idiopathic environmental intolerance." Epidemiology of electromagnetic fields. CRC Press, 2014. 261-274.

Comment [DJ]: Include (IEI-EMF)?

Comment [DJ]: I used IEI-EMF in this factsheet, but think we should consider using EHS only here. It becomes highly confusing mentioning both. What do you think?

IEI-EMF is also mentioned in the cited journal articles. At the same time, WHO calls it EHS. \

I would prefer to consistently use IEI-EMF instead of EHS since it is more neutral

Comment [DJ]: Insert link to RF information

A large number of studies have been conducted on individuals reporting focused on those with EHS, particularly by European investigators. These include laboratory studies, in which EHS individuals are tested in well-controlled and blinded studies to determine whether exposure to EMF can trigger the symptoms. Other studies are observational, looking at everyday exposures and a possible link with EHS.

These studies have been generally unsuccessful in linking exposure to EMF to the symptoms reported by an EHS individual. Well controlled, blinded "provocation" studies show that subjects report symptoms when they believe that they are exposed to EMF or anticipate such exposure, not when they actually are exposed. Some studies have found evidence for the nocebo effect in some EHS individuals (in which sham exposures are sufficient to trigger symptoms).⁷ Some investigators have suggested that psychological factors related to the concerns of the individual about exposure to EMF (as opposed to any direct effect of exposure) may play a role in the problem. This view is commonly rejected by many IEI-EMF individuals and their advocates.

Expert reviews by through health agencies or other official bodies have consistently concluded that no clear evidence exists linking the symptoms of EHS to exposure to EMF in the environment.^{9,10}

What do health agencies conclude about IEI-EMF?

For example, a In its fact sheet on electrical hypersensitivity by, the World Health Organization (WHO) concluded:

"Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem... no scientific basis currently exists for a connection between EHS and exposure to EMF." A 2012 review prepared under the auspices of the Swedish Council for Working Life concluded "Radiofrequency fields have not been shown to trigger symptoms in subjects who perceive themselves as hypersensitive to RF fields and this group has not displayed any better ability to detect exposure to electromagnetic fields than reference groups that do not report this type of sensitivity."¹¹

Treatment options

⁷ Rubin, G. James, Rosa Nieto - Hernandez, and Simon Wessely. "Idiopathic environmental intolerance attributed to electromagnetic fields (formerly 'electromagnetic hypersensitivity'): an updated systematic review of provocation studies." *Bioelectromagnetics* 31.1 (2010): 1-11.

⁸ Baliatsas, Christos, and G. James Rubin. "Electromagnetic fields, symptoms and idiopathic environmental intolerance." *Epidemiology of electromagnetic fields*. CRC press, 2014. 261-274.

⁹ Health Effects from Radiofrequency Electromagnetic Fields. Report of the independent Advisory Group on Non-ionising Radiation (Health Protection Agency, UK, 2012) Available on the Internet at <https://www.gov.uk/government/publications/radiofrequency-electromagnetic-fields-health-effects>

¹⁰ Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR Opinion on Potential health effects of exposure to electromagnetic fields (EMF), European Commission, 2015. Available on the Internet at http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf

¹¹ A. Ahlbom et al., "Radiofrequency electromagnetic fields and risk of disease and ill health: Research during the last ten years", Swedish Council for Working Life, Stockholm, 2012. Available on the Internet at ...

Comment [DJ]: I don't think folks will understand what nocebo effect is.

Can we remove this last sentence? I feel like you are saying it above. OK

The WHO fact sheet on EHS also recommended:

“Treatment of affected individuals should focus on the health symptoms and the clinical picture, and not on the person's perceived need for reducing or eliminating EMF in the workplace or home.”

A few physicians consider that the symptoms are caused by actual exposure to environmental EMFs and recommend reducing the exposure of such individuals to EMF in their environments.¹² However, in the absence of objective tests that link EHS symptoms to EMF exposure, such theories have not been accepted by health agencies and remain controversial. ~~However, in the absence of objective tests that link EHS symptoms to EMF exposure, such theories remain controversial.~~

There has, however, been little research, and few randomized controlled clinical trials, on the treatment of EHS. In view of the high prevalence of the condition and undeniable distress of many IEI-EMF individuals,—that remains a research need. CDC will continue to monitor this issue.

For More Information:

WHO Fact sheet on electromagnetic hypersensitivity (<http://www.who.int/peh-emf/publications/facts/fs296/en/>)

Demers, Paul, et al. "A Review of Safety Code 6 (2013): Health Canada's Safety Limits for Exposure to Radiofrequency Fields." (2014). (a recent review of IEI-EMF)

¹² Genuis, Stephen J., and Christopher T. Lipp. "Electromagnetic hypersensitivity: Fact or fiction?." *Science of the Total Environment* 414 (2012): 103-112.