

Electrical Hypersensitivity, a reaction to the environment

Human beings (and other living creatures) rely on electrochemical communication in the body for survival. Messages within and between cells determine the health and well-being of the individual, including accurate cellular replication. These messages consist of amazingly complex instructions involving the interchange of electrical impulses and chemical changes. This process begins at conception and only ceases at death.

Changes in the way that this communication takes place may make no difference to the individual at all, or it may cause damage to the body and be repaired, or the body may be so seriously affected that it is unable to cope and develops a serious illness, as a result of which it may die.

Which of these things happen will depend on a number of factors:-

1. What the electrochemical insult is
2. How strong the individual's immune system is
3. Whether the electromagnetic disruption is continuous or a one-off event
4. Whether the disruption is at a level or is of a type that the individual system is particularly responsive to
5. Whether the electromagnetic phenomenon is a new one, one that the species has evolved with and, by and large adapted to, or one that we need for our well-being.

Some people seem to be up to 100 times more sensitive to their biological systems being affected by external sources of electromagnetic fields, either at low (powerfrequency) or high frequency (including mobile phone communications technology), than others (Leitgeb [2003](#), [2007](#)). The condition they have is referred to in a variety of ways; as electrosensitivity, or as electrical sensitivity or hypersensitivity. This condition is referred to as ES throughout this article.

Human beings, and all other living creatures, have always been exposed to electromagnetic fields. The sun's radiation levels and the natural earth energies are what the human being has evolved with and adapted to. So the sceptics ask, how come we are suddenly talking of a sensitivity to electromagnetic fields when we have never reacted before?

Things have changed, that's why. The density of electromagnetic fields around us is now many hundreds of millions of times the natural level reaching us from the sun and other sources. We have not had the time even to begin to adapt to the radiation from our use of electricity, mobile phones and telecommunications masts, and proliferating wireless technologies.

What is worse, there are certain natural sources of radiation (e.g. Schumann waves) that human beings are dependent on for their well being. When people first went into space, they developed symptoms of ill-health. It was believed that this was because they had lost touch with this naturally beneficial electromagnetic radiation. The ill health effects lessened when artificial generators of Schumann waves (7.83 Hertz) accompanied astronauts in their spaceships. We are beginning to lose touch with Schumann waves and other natural sources of radiation, because they are now swamped by man-made radiation; our systems are no longer able to detect or resonate with them.

Man-made EMF pollution was almost non-existent one hundred years ago. Since that time, the world has changed dramatically in EMF terms, from the arrival of electricity, to the ubiquitous wireless telecommunications systems and new developments in wireless technology. Electromagnetic fields (EMFs) can be biologically active, capable of making changes in the structure of human and animal cells, and in the communication systems within and between cells.

Research has shown that there is an association between exposure to EMFs, produced whenever we are exposed to the use of electricity and microwaves, and adverse health effects, including cancers in at least some people (Milham and Osslander [2001](#)) and animals, see Section 4, The Biology.

The real growth of commercial radio broadcasting started in the early 1930s. In 1932 the **Wireless Constructor** magazine was reporting: *“Every week one reads of some station planning to radiate enormous power, some fiddling little continental (station) will suddenly develop into an overpowering giant”*. It warned *“you may find yourself in the position of a paralysed man watching the rising of a tide which will ultimately drown him.”* Prophetic words?

Electromagnetic radiation takes its place among other sources of environmental pollution such as pesticides and herbicides, fuel by-products, chemicals in and on foods and used in the home and garden, nuclear radiation, exposure to industrial toxins and waste products ... the list goes on. The 1873 levels of ozone recorded in Paris were roughly half that of today. This is symptomatic of a global increase in ozone at ground level, where it is a serious toxic pollutant (Flannery 2005). Tim Flannery also says that a major impact on human health comes from the capacity of ultraviolet radiation (UV) to damage the immune system.

Various estimates indicate that about 10% of the population are sensitive to radiation and chemicals / pharmaceuticals; the environmental group Polluting Our Future determines that about 1 in 200 American children live with developmental or neurological disabilities caused by exposure to toxic substances.

The California Department of Developmental Services reported a 273% increase in the number of people receiving autism services between 1987 and 1998. The report says there is a genetic predisposition, but apparently some environmental factor is triggering it. Electromagnetic pollution (electro-smog) is no more damaging than many of these other pollutants, but when you add it into the toxic soup, it leads to more people being affected by an increasingly hazardous environment, and some scientists have proposed a synergistic effect, whereby exposure to two pollutants at the same time (or sequentially possibly) creates an adverse health reaction, whereas exposure to one or the other, would not do so.

People vary in their sensitivity to EMFs, as they vary in their sensitivity to chemical pollutants.

Some people can detect the unseen presence of electromagnetic fields, but remain unaffected by them (these people are sometimes referred to as electrosensible), though this is not always detectable experimentally (Kwon [2008](#)). Laboratory conditions do not always mimic reality as closely as experimenters believe. Rubin ([2010](#)) dismisses the possibility of the existence of ES because it has not been detectable by some studies that have received a lot of criticism (see Section 8 Appendices). Some people cannot detect EMFs consciously, but their health and well-being are damaged in its presence. Some both detect electricity and are adversely affected by it.

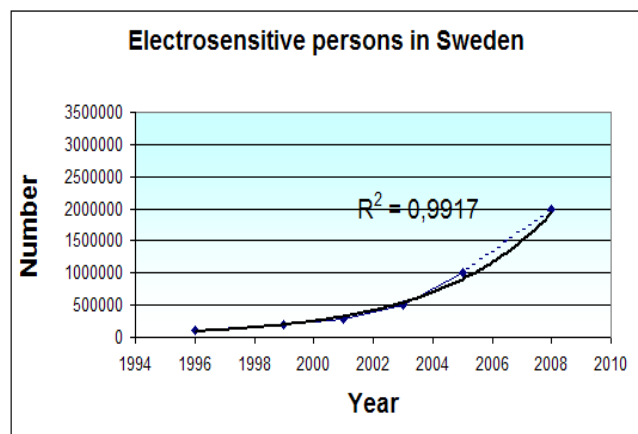
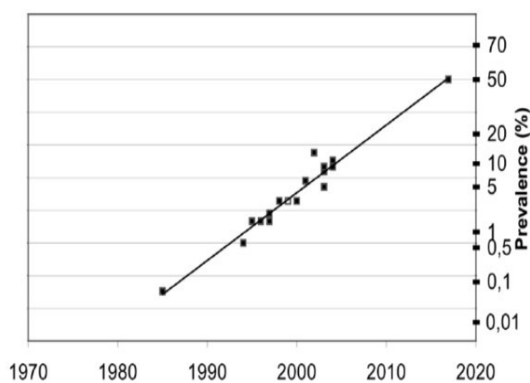
The people who are affected by EMFs are often called electrically hypersensitive (EHS), to distinguish them from those people who can detect EMFs but apparently remain unaffected by them. Electrical Sensitivity (ES) is a primarily a syndrome of adults, and this could be because it may take more than one exposure condition for ES to appear. These other exposures may include one or more of the other pollutants, especially chemicals, mentioned above. Many people who have ES also suffer from multiple chemical sensitivity (MCS) or a form of ME.

The percentage of people affected varies from researcher to researcher and country to country, because of different criteria and strength of symptoms. It is suggested that about 5% of the population are sensitive (Sweden & California, below; Switzerland 5%; UK 4%; Austria 3.5%; Germany 8-10%).

T Lindblom, in a private communication, said that in Sweden in 2005, 1 million people believed that EMFs caused their health problems. He believes that the number is now doubling every 3 years. Hillert (2002) in a questionnaire survey of 15,000 people in Sweden found widespread concern about electrical sensitivity in the general population. 1.5% of the population reported hypersensitivity and with significantly more symptoms than the non-sensitive respondents. Also in 2002 Levallois conducted a telephone survey of people in California, 3.2% reported being "very

Electrosensitive [Hallberg und Oberfeld 2006]

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sensitive to electrical devices". Hallberg and Oberfeld (2006) looked at the various international studies and from 2000, they estimated that between 3 and 13% of differing populations were electrosensitive. They predicted that if the numbers continued to rise as they had been, by 2015 up to 50% might develop ill health symptoms as a result of exposure to EMFs.

Lindblom says that the cost for sick leave has developed along an exponential curve starting from 1996 when mobile phones became common in Sweden. The cost in 2006 was about 89 billion kronor, rising to 204 billion kronor by 2010 ($R^2=0.994$). Even the authorities are suggesting 90 billion kronor.

In 1993, when the Swedish Unions began to record the number of people who believed their health problems related to their EMF exposure, the figures would hardly have begun to include people affected by their use of mobile phone technology. It was too new and too few people used mobile phones much. Nowadays the situation has changed beyond recognition, with electromagnetic fields filling our towns, cities, transport facilities, leisure and health care centres, and wireless innovations filling homes and the general environment.

In July 2009, Professor Dominique Belpomme, the president of the Preventive Cancer Research Association (ARTAC) called electromagnetic hypersensitivity "a major health problem" and "a real threat to public health." He says "We are convinced that it is the mixture of different sources of EMFs –

from masts, powerlines, WiFi etc. that causes this syndrome. We are working on a hypothesis of causation involving magnetosomes, micro-electric magnets that people have in their brain."

The number of mobile phone masts seems to grow exponentially, and the design of the masts change as more are needed and people dislike them for aesthetic reasons as well as the possible health impact they have. They have had to become less visible, so that local residents will not object, or may even be unaware of their existence.

'Street furniture' mobile phone transmitter masts (microcells) appear along streets to boost reception or to handle increasing 'call-traffic density' in areas that have a high proportion of users. They are not needed for 'area coverage', but to provide enough channels to handle the density of call traffic without risk of the system 'dropping' calls. More people want to use their mobile phones *inside* buildings, so more masts have had to be erected to cope with the demand, and to provide the increased power necessary to penetrate building materials.

Microcells were originally intended to be able to work at low power as a booster to cope with extra calls. To provide coverage *inside* buildings and give good quality calls, they have to be quite high powered, bathing passers-by in a sea of radiation waves. These masts may make many streets impassable for ES individuals, and some houses, with microcell antennas radiating outside, will be uninhabitable for ES people. Locating such devices so close to people's living spaces will no doubt create thousands more ES sufferers. Femtocells have been offered by the phone companies as a solution to anyone who wants their own mobile phone base station inside their home. This may help reduce the exposure for everybody else, except potentially near neighbours who are not given the same choice.

Our exposure to new sources of electromagnetic pollution is increasing all the time. Most chronic environmental pollution problems take many years to manifest in a generally healthy population. Some sensitive individuals will succumb in a much shorter time frame, but these will just appear as 'noise' in any generalised research data on sections of the whole population and so are likely to be ignored. Some relatively new environmental pollution exposures, such as water fluoridation or GM foods, may be predisposing people to ES, either directly or due to the general weakening of the immune system.

For many people who react to electromagnetic fields, either low or high frequency or both, there is the problem of recognition for their health problems. Under what heading should it be recognised?

Should ES be diagnosed as an illness?

Most *illnesses* recognised by the mainstream medical profession are treated with a combination of surgery, lifestyle changes, and drug therapy.

- There is nothing to remove in ES, so surgery is inappropriate.
- Lifestyle changes, such as diet modification in the case of diabetics, people with high cholesterol, smokers, etc may be recommended, as the connection between the changes in lifestyle and a biological reaction, hopefully leading to an improvement in the condition, is well established.

It is difficult in the case of ES to establish the same connection between the lifestyle change (i.e. not using a computer, or getting your neighbour to exchange their DECT phone for a wired one) and the biological reaction responsible for the potential change in health. The

biology is not there as yet in an undisputed form (see Section 4), and it varies significantly from affected person to person.

- Many medical practitioners already go down the drug therapy route and refer their ES patients to their psychiatric colleagues, who they believe are better able to treat people who have a delusional problem; a distortion of reality. This is not a productive avenue.

Should ES be diagnosed as an allergic (atopic) condition?

This may not sound as definitive; it may not sound as if it has the same legitimacy as a 'proper' illness. However, it does open up the possibility of dealing with the environment.

There are warnings on food packaging to alert people with food allergies to the possible presence of nuts, seeds, milk products, etc. There are warnings of pollen counts on weather forecasts. It seems as if environmental sources of pollution for people with allergies are recognised and warnings are beginning to be used as standard. This may be an appropriate route for the design of packaging of WiFi systems, laptops, phones, etc. It would not deal with wLANs and WiMAX, but it is a start.

The number of adults and children diagnosed with eczema has risen to 5.7 million in England alone. One of the authors of a recent paper (Simpson [2009](#)), Professor Aziz Sheikh at the University of Edinburgh, said "*Why eczema is important is increasingly we think eczema is a herald condition for individuals to go on to develop other allergic conditions, such as asthma and allergic rhinitis.*" The theory is that allergens may be able to cross the skin in people with eczema to cause disease whereas in people without the condition the skin is able to act as a barrier. It may be that ES people with skin conditions as one of their symptoms may also have this skin 'leakage' problem.

Having ES recognised as an allergic condition would avoid the need to talk of drugs, and psychiatric input as the first option, although when the condition is unrecognised by friends, family, GPs, etc. the very people we may turn to for help and support, it is hardly surprising that sufferers can also experience psychological problems such as depression.

Should ES be diagnosed as a 'functional impairment'?

ES is not a single reaction to a single exposure. The exposure to which the sufferer is sensitive varies from one individual to another. The symptoms people develop as a response to exposure is also very variable, depending on genetic susceptibilities and other factors that biologists are only just beginning to explore.

Person A might not be able to use a computer at all, being highly sensitive, whereas B has no problem as long as he or she does not spend 6 hours a day in front of one. A and B may both feel affected by fluorescent lights and find them intolerable if they are exposed to them for long periods. A may be able to use a digital cordless phone without any apparent side effect, whereas B cannot tolerate one even in a neighbour's flat.

What makes A and B so different? What makes them both different from C who is not bothered by any of these pieces of equipment?

In a BBC programme about twins shown in October 2009, the genetic codes of an identical pair of adult twins were examined at the beginning and at the end of one year. In one twin there were 4 epigenetic changes and in the other there were 22 such changes. Epigenetics is where DNA changes 'switch on' or 'switch off' biological changes within the individual. These changes may,

or may not, have health implications. It is clear from this that variations between identical twins can be common and cumulative over time. It is not surprising that unrelated individuals will be very different and react to environmental exposures in different ways.

We know that people can be very badly affected by EMFs. We do not yet know how, although there are a number of theories as to the underlying biology that can explain the reactions and also the difference in reactions. For example, a study by Dahmen ([2009](#)) found that people with ES also had a greater likelihood of thyroid dysfunction, liver dysfunction and chronic inflammatory processes than those without ES. They suggested that these produced the symptoms reported by people as the results of EMF exposure. Their conclusions omitted the possibility that the two things could co-exist, as results of a change in biological processes caused by EMF exposure. Meanwhile, it has been suggested by Olle Johansson, one of the foremost experts in the field of ES research that the title of 'functional impairment' may be a good one to enable people so affected to obtain support in changing their homes and lifestyle, without the 'psychiatric' label being attached.

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