

Electrical Hypersensitivity (ES)

The Electrical hypersensitivity set of articles is separated into 8 sections, each of which can be individually downloaded. It is a 'work in progress' incorporating new information whenever time permits.

Section 3

The triggers and symptoms of ES

1. Electrical Hypersensitivity, a reaction to the environment; introduction, should ES be diagnosed as an illness? Should ES be diagnosed as an allergic (atopic) condition? Should ES be diagnosed as a 'functional impairment'?
2. What ES is and what produces it; ES and the problems of diagnosis; Allergy/functional impairment; what produces ES? The Hum; ultrasound
3. The Triggers and Symptoms; what can provoke symptoms; the symptoms; behavioural disturbances; haematological (blood) effects; breathing problems; cardiac problems; cognitive changes; eyes; headaches and migraines; other symptoms experienced on the face or in the head; ingestion and digestion disturbances; joint, muscle, limb and nerve sensations; light sensitivity; psychological effects; skin; sleep disturbance, tiredness & dizziness; other reactions
4. The Biology; the living being; what effects do EMFs have on living beings? Why do only some people become ES if all people are coping with increasing EMF stress? Research problems; what different countries have found, or are finding
5. What you can do; Reducing your exposure to EMFs, in the home, in the work place, in the community; treatments and other things that can help, acupuncture, chiropractic, diet including supplements, pulsed electromagnetic field therapy, exercise, geopathic stress, grounding, holidays, homeopathy, hydration, injections, ionised environments, medication, oral treatment, osteopathy, oxygen therapy, plants, prayer and healing, protection 'devices', provocation therapy, psychological improvements, water supply; screening products; raising public awareness; campaigning and information organisations
6. The Challenges; what can the ES person do? Recognition by the general public; employment and benefits advice; Disability Discrimination Act 1995, words (or phrases) defining disability according to the DDA, mobility, memory or ability to concentrate, learn or understand; accidents, incidents and liability; policy makers abroad; normal day-to-day activities; education needs; employment needs; housing needs; transport needs
7. References – 148 references

8. Appendices:

Appendix 1- The Powerwatch response to the October 2005 Health Protection Agency–Radiation Protection Division report on Electrical Sensitivity; definition of ES; epidemiology of ES; management of ES

Appendix 2 - Powerwatch Comments on Rubin et al study, 2006

Appendix 3 - Study Flaws (Essex), Flaw counter-arguments, discussion, conclusion, Essex University study on Health Effects from TETRA radiation (2010)

The Triggers and Symptoms of ES

What can provoke symptoms

Initiation of ES often comes at a time when people are experiencing an intensive work period, which suggests that the changes in people's systems due to stress may increase the person's sensitivity to environmental factors. Stress sensitive hormones such as prolactin and thyroxine have been found to be elevated in people at work in electromagnetic environments (and in ES sufferers), but not when they are at leisure. Prolactin plays a key role in moderating parts of the neuroimmune system and may also be an important precipitator of autoimmune diseases.

ES or Idiopathic Environmental Intolerance - Electromagnetic Fields (IEI-EMF) is associated with various types of psychological symptoms and with poor health-related quality of life according to a [2016](#) study by Kjellqvist. It is likely that these symptoms may occur as a result of ES rather than as a precursor and cause of ES.

It makes little difference what the initial provocation is. Once a person is exposed to time-varying electric and magnetic fields, they may also begin to react to chemicals, including pesticides and herbicides, and / or electromagnetic radiation, whether ionising or non-ionising in a sensitised manner. The condition is usually associated with a severely dysfunctional immune system. In a study carried out by Eltiti and colleagues (2004) 54% of ES respondents indicated that they were also sensitive to chemicals and there was a significant correlation between the degree of sensitivity to chemicals and sensitivity to EMFs.

In February 2006, Götene, in Sweden, powered up its wireless internet system. Right after this, 8 citizens became ill with heart palpitations, breathing problems, nausea, headache, dizziness, etc, and some had to leave their homes.

Hillert ([1999](#)) surveyed a number of people reporting hypersensitivity and concluded that skin problems, and not neurovegetative symptoms, characterize the syndrome, at least during the first years of illness. Stenberg ([2002](#)) concluded that people with only skin symptoms had a better prognosis than those with a more generalised sensitivity to electricity, possibly because they are at an earlier stage. Eltiti ([2007](#)) developed a questionnaire with 8 subsets of symptoms: neurovegetative, skin, auditory, headache, cardiorespiratory, cold-related, locomotor and allergy-related. People with ES showed a greater severity of symptoms on all subscales compared to the control group. On a self-assessment part of the questionnaire, there were significant differences between people with ES and others according to their responses to the sources of EMFs listed below. The percentages given here are based on their responses as to whether they believed their symptoms were linked to their exposure "quite a bit" or "a great deal". The number is the percentage of people with ES who link the two.

- Chemicals 26%, including foods, moulds, perfumes, etc. One study in California found 16% of respondents were chemically sensitive. 15% of these also were electrically sensitive.
- Computers 42%
- Electrical appliances 42%
- Smart meters
- Fluorescent lighting 42%, including the energy efficient CFL bulbs
- Cordless phones
- Microwave ovens 32%
- Powerlines 40%
- Radio/TV transmitters 48%
- Telecommunications masts 60%
- WiFi
- Televisions 46%
- Electronic signature pads (such as those used by parcel delivery services, and by staff in supermarkets)

To be considered to be ES, there has to be a combination of a number of the symptoms (see below), plus the fact that these symptoms *noticeably* appear or get worse near electrical appliances, power lines, mobile phones, mobile phone base stations and / or other electromagnetic field sources, and that they *diminish* (or *occasionally disappear*) away from the EMF source. We do not know the time scales for the development of ES, nor the time scales for the effects to go away when the person is in an electrically quieter environment. We do know from repeated anecdotal evidence that the more highly ES a person is, and the longer they have suffered from it, then the longer it takes for the symptoms to subside when they go away to an electrically quiet place (like a cottage without electricity and no RF exposure). We do know that it can take at least several weeks for the benefits to be felt. It has been suggested that at least 3 months should be allowed for the body to detoxify after an acute exposure, before an attempt is made to re-introduce the offending EMF source. People with skin-only symptoms are reported to have a better prognosis, with the cessation of symptoms expected after some months. Experience, especially from Sweden, suggests that early intervention in helping people manage their ES may prevent an aggravation of symptoms, and possibly lead to a better prognosis.

Kato & Johansson (2012) found that the most plausible trigger of EHS onset was a mobile phone base station or a personal mobile phone (37%). Sixty-five percent experienced health problems to be due to the radiation from other passengers' mobile phones in trains or buses, and 12% reported that they could not use public transportation at all. Fifty-three percent had a job before the onset, but most had lost their work and/or experienced a decrease in income. Moreover, 85.3% had to take measures to protect themselves from EMF, such as moving to low EMF areas, or buying low EMF electric appliances. EHS persons were suffering not only from their symptoms, but also from economical and social problems.

People vary in their sensitivity to EMFs, and a proportion of the population can become ES possibly triggered off by exposure to one or more of the other pollutants, especially chemicals, mentioned above. We estimate (from assessing various sources of information) that about 3 to 8% of the population of industrialised societies are significantly ES (4,800,000 is about 8% of the UK population) and maybe up to 35 % show some indications of electro-stress, according to Dr Thomas Rau, medical director of the Paracelsus Clinic in Switzerland. The problem with normal epidemiology (the study of health in the population) is that it still looks for problems to show up in studies of whole, "randomly selected", groups of the population. When only a small percentage of the population are strongly affected, what should be strong evidence disappears into the "noise".

"Mainzer EMF-Wachhund," a watchdog project, offered a system of self-notification of health complaints attributed to exposures to electromagnetic fields (EMFs) to a population of a part of Germany. 192 persons reported such health complaints in the period from October 2003 to March 2005. Of these, 56% classified themselves as electromagnetic hypersensitive (EHS). A large number of subjects did not classify themselves as EHS and reported very specific links between exposure and symptoms (Schüz [2006](#)).

Johansson & Redmayne ([2016](#)) reported the incident of a woman who had suffered from West Nile infection including focal seizures, ataxia, vertigo and headaches 11 years previously. She began to experience the same symptoms again and found out that a new type of wireless modem, enabled for both personal use and functioning as a public hotspot designed to reach up to 100 m, had been installed in the flat under hers. Her symptoms disappeared when the neighbour replaced the modem with a router without the hotspot feature. When another activated hotspot was installed in an adjacent flat, she once again noticed symptoms.

The diagnosis

Belpomme ([2015](#)) concludes from 6 years of clinical and biological testing that EHS and MCS can be objectively characterized and routinely diagnosed by commercially available simple tests. Both disorders appear to involve inflammation-related hyper-histaminemia, oxidative stress, autoimmune response, capsulothalamic hypoperfusion and BBB opening, and a deficit in melatonin metabolic availability; suggesting a risk of chronic neurodegenerative disease. Two out of three patients with EHS and/or MCS were female; mean age (years) was 47.

The symptoms

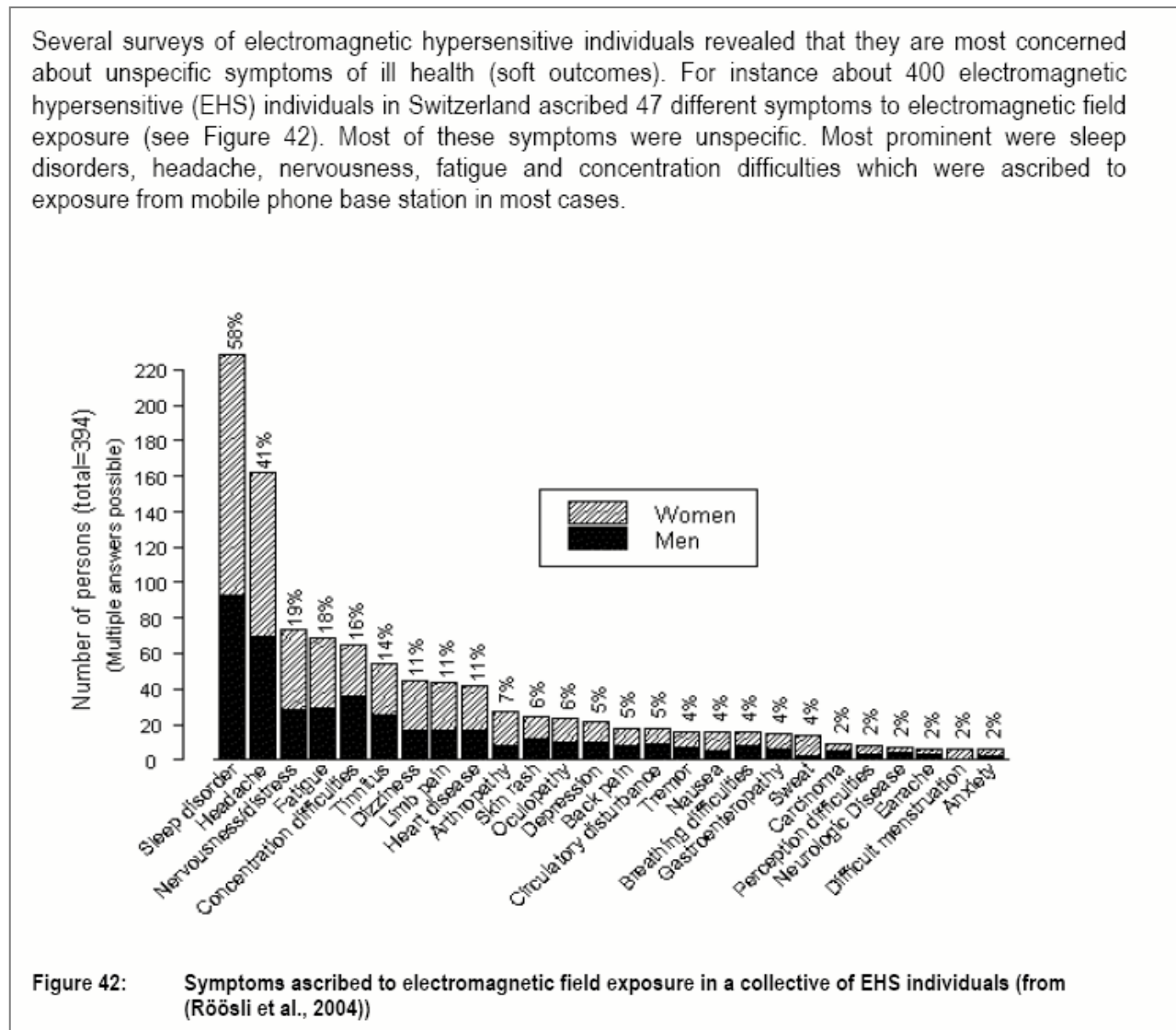
The symptoms of ES seem to vary considerably according to the genetic make-up and susceptibilities of the individual, which makes it such a hard condition to diagnose. It has been described as causing symptoms "*similar to a hangover*", along with more serious health implications. It often occurs in people who are reactive to other environmental pollutants, who have allergies, or who have been exposed to a significant event, such as an electric shock or a road traffic accident. Sometimes it is an accumulation of exposures over some time, where the body's defence mechanisms seem to have been stretched beyond its ability to endure further 'insults'.

As mentioned in the previous section, it is not a typical 'illness' in that it does not have specific symptoms, treatment, or outcomes. Olle Johansson, one of the world's experts in ES, chooses to refer to ES as a 'functional impairment'. This describes the ES sufferers problem with functioning in environments in which people without ES manage, and may well open up possibilities of precautionary exposures, appropriate housing and financial benefits that people with ES currently have very little access to. A syndrome by any other name...? The benefits may well outweigh the need to recognise ES as an illness distinct from many of the other environmental problems that also need support.

Havas ([2013](#)) describes EHS as a 'rapid aging syndrome', with increasingly common physiological responses which include clumping (rouleau formation) of the red blood cells, heart palpitations, pain or pressure in the chest accompanied by anxiety, and an upregulation of the sympathetic nervous system coincident with a downregulation of the parasympathetic nervous system typical of the "fight-or-flight" response. Provocation studies presented in her article demonstrate that the response to electrosmog is physiological and not psychosomatic. Those who experience prolonged and severe EHS may develop psychological problems as a consequence of their inability to work, their limited ability to travel in our highly technologic environment, and the social stigma that their symptoms are imagined rather than real.

Provocation studies on EMF have yielded different results, ranging from where people with EHS cannot discriminate between an active RF signal and placebo, to objectively observed changes following exposure in reactions of the pupil, changes in heart rhythm, damage to erythrocytes, and disturbed glucose metabolism in the brain (Hedendahl [2015](#)).

Symptoms of electrical hypersensitivity can occur in the presence of most types of energy within the electromagnetic spectrum (ELF, VLF, RF, infrared radiation and sunlight), though individuals with ES are primarily sensitive to certain frequencies of EMF. The symptoms can be very variable, affecting most systems in the body and they vary in severity. Research carried out by Lyskov ([2001](#), [2001](#)) and Sandström ([2003](#)), indicated distinctive differences in physiological parameters between patients with ES and those without. They reported that patients with ES have an imbalance in the autonomic regulation, increased responsiveness to a variety of environmental stimuli and psychophysiological signs of sustained arousal. They believe that sustained arousal and altered stress responsivity are important factors in the genesis of different forms of IEI or Idiopathic Environmental Intolerance.



Many of the symptoms are also commonly experienced in other stress related conditions, which is why it is difficult to have ES accepted as a diagnosis. A multifactorial background implies that the symptoms can be caused by a number of different situations which in turn means that not everyone with a particular symptom or combination of symptoms will have developed them through the same causal chain. Another characteristic of a multifactorial background is that a

combination of factors, possibly a large number of factors, will have to be present before the symptoms present themselves.

Röösli reported that *“Health disturbances were considerably more prevalent in the EHS group compared to the rest of the study population. However, we did not find evidence that health disturbances of EHS individuals were associated with RF-EMF exposure.”* Using one type of EMF exposure can always result in equivocal research results, as not all study participants react the same to the same source, even though the symptoms they experience can be the same as those who do react to the source they are all being exposed to.

The graph on page 5 taken from the study by Röösli (2004) shows the range of symptoms and frequency with which they tend to be experienced. No one ES sufferer is likely to suffer from all of them, but several of them are likely to point to an environmental cause rather than some other condition.

From a study by Gómez-Perretta (2013), the symptoms most related to exposure to mobile phone base stations were lack of appetite, lack of concentration, irritability and trouble sleeping.

Many people with ES also suffer from other organic diseases such as diabetes and thyroid dysfunctions, as well as from medically unexplained syndromes such as multiple chemical sensitivity, fibromyalgia, chronic fatigue syndrome, burnout and sick building syndrome. Fibromyalgia and burnt-out syndrome, with symptoms similar to those exhibited by people suffering from ES were first documented in Sweden in 1991.

A questionnaire was completed by 250 electrohypersensitive people in Holland (Schooneveld & Kuiper 2007) who contacted the ES foundation on their own initiative. The worst symptoms were chronic fatigue (70%), concentration problems (68%), hearing problems (67%), face and skin problems (66%) and insomnia (63%). DECT phones, TVs, computers and WiFi were considered to be the worst sources of troublesome EMFs. You can view the questionnaire and study in full here: http://www.powerwatch.org.uk/news/20071218_ehs_netherlands.pdf

The following lists the groups of symptoms that are reported by people who suffer from ES. Many of the problems were originally associated with VDU use, where ES was first recognised, and the symptoms begin with eye problems and facial heat or burning. The problems, if not addressed, then are associated with other symptoms, indicating that neurological systems are becoming affected.

Behavioural disturbances

People may roll on the floor, be restless, agitated, very disturbed. Their bodies won't hold adjustments, spontaneous snapping out of neck and spinal vertebrae, and spinal and lower backache.

Haematological (blood) effects

Profuse nose bleeds and blood pressure changes are both symptoms experienced by ES sufferers. One person who is ES checked his blood pressure readings. In the morning it was 120/70, and then surrounded by electrosmog at work 189/106, 160/104 and 158/103. These readings, of course, could have changed for other reasons, but as this effect has been widely reported, we would like to see further detailed investigations carried out.

Breathing problems

People with ES might have difficulty in breathing. They may have shallow laboured breath, breathlessness, or a feeling of pressure in the chest. They may develop an intolerance to perfume. Some people cannot manage to be indoors unless they are in a draught of outdoor fresh air.

Cardiac problems

You may experience irregular heartbeats (arrhythmia), or other heart problems. A 58-year-old man began to suffer from mild heart palpitations when he got a DECT phone. In a matter of weeks, they became severe, resulting in being rushed to hospital. He got rid of the DECT phone and has had no palpitations since. Another carried his mobile phone in his motorbike jacket's front left pocket. When he stopped doing so, his heart palpitations vanished.

The cells of the heart muscle have been shown to lose membrane calcium following electromagnetic exposure and may leak. Normally, the rhythm of the heart is controlled electrically by waves of programmed ion leakage that spread through the heart causing it to contract. Unscheduled ion leakage brought about by electromagnetic radiation can disrupt this process and induce cardiac arrhythmia, with a consequent increased risk of getting heart attacks.

An initial study by Havas (2010) showed immediate and dramatic changes in both heart rate and heart rate variability associated with microwave exposure at levels well below the public exposure guidelines in Canada and the United States. In a further study by Havas & Marrongelle (2013), a few participants had a severe reaction to the radiation from a cordless phone base unit with an increase in heart rate and altered heart rate variability indicative of an alarm response to stress. 7% were classified as being 'moderately to very' sensitive, 29% were 'little to moderately' sensitive, 30% were 'not to little' sensitive and 6% were 'unknown'. Novel findings included the documentation of a delayed response to radiation, leading to an underestimation for those who have a delayed autonomic nervous system reaction. The authors felt that the results could under diagnose those who have adrenal exhaustion as their ability to mount a response to a stressor is diminished.

Cognitive changes

The person with ES complains of being unable to think, finding it difficult to concentrate and suffering from memory loss, the latter two particularly in people who use mobile phones often. They first notice the problem with regard to short-term memory. It is unclear whether there may be longer-term repercussions. The person with ES may experience periods of 'missing time', or blackouts, which can be induced by external electric fields on the sensitised ES brain, producing this epileptic-like activity. The symptoms have also been described as *"like moving through a dense fog."*

People with electrical hypersensitivity have significantly higher natural rates of membrane leakage. When the neurons of the brain leak, they become more likely to transmit nerve impulses, some of which are spurious and have no right to be there. Thus symptoms can include brain hyperactivity, mental fogginess, loss of concentration, sleep disturbances, stress headaches, migraine and possibly an increased risk of people with epilepsy getting seizures.

Another effect on the brain is the disruption of the blood-brain barrier. Electromagnetic exposure makes this layer leak potentially toxic substances that can cause permanent brain damage. The effects of this may not be immediately apparent because the brain has spare capacity, but are likely to be progressive and lead to early dementia.

Eyes

Eye trouble is frequently reported. People experience difficulty in seeing, they may have double vision, or they have a smarting, irritating sensation, pain, or a feeling as if they had grit in their eyes. People can become sensitive to light, especially from fluorescent lights, computer screens, and even sunshine.

Headaches and migraines

An increase in the number or frequency of headaches is reported by most ES sufferers. There are five types of migraines, three of which do not have the severe head pains that are commonly associated with migraines. These are called resonance migraines, and they are present in most ES people. It is believed that resonance migraines are caused as a result of pulsed fields on the brain stem. People may suffer from headaches which can be accompanied by a buzzing sound or feelings of depression.

A high-profile ES sufferer was reported in the Norwegian papers in March 2002. The World Health Organisation (WHO) Director-General and former Norwegian Prime Minister, medical doctor and master of public health, Gro Harlem Brundtland, gets a headache as soon as she puts the phone to her head. She has become so sensitive to mobile phone radiation that people within 4 metres of her must turn their phones off in order to stop her feeling ill. Even phones turned on, but not in use, set off her headaches. She thought she could avoid the pain by reducing the time she spent on the phone, but it didn't help. The headache she gets from the radiation goes away within half an hour to an hour after her exposure stops.

She became ES due to an accident with her microwave oven. She placed some food on a plate that had a pattern containing blue flowers into the oven. The plate began to spark, and she went closer to see what was happening. Her eyes were damaged and she was blinded for 1 year. She still has poor eyesight. It turned out that the flowers were made of cobalt blue paint. From then on, she was ES.

One ES sufferer had a pendant halogen light and she had terrible headaches until she removed it.

Other symptoms experienced on the face or in the head

Faces can feel swollen, they sting, and blisters can appear. People may experience warmth, or a burning sensation in the face, not unlike strong sunburn. The mucous membranes can feel dry or can become swollen, resulting in nonviral / bacterial swelling of nose, throat, ear and sinuses. They can get blisters and a metallic taste in the mouth. They might feel pain in their teeth and jaws, and it can spread all over the face. Two dissimilar metals in the mouth (from different fillings) can result in abnormal electrical charges. Ears can feel blocked up, and noses sometimes itch. Swollen glands have also been reported.

Ingestion and digestion disturbances

People with ES may experience dry mouth, loss of appetite (Navarro 2003), nausea, excessive thirst, dehydration, loss of taste, gagging, sickly feeling in the stomach, stomach upset or bowel disturbances.

Joint, muscle, limb and nerve sensations

People with ES can get aches, pain, numbness, or prickling sensations in joints, bones and muscles in shoulders, arms, legs, feet, wrists, ankles, elbows and pelvis and cramp in arms and legs. This can develop into chronic, sometimes severe pain, especially fibromyalgia.

Gro Harlem Brundtland (quoted above) gets an instant reaction if she touches a DECT phone, which gives off as much microwave radiation as a mobile phone. She also has symptoms from her laptop PC, but not a desktop PC. If she holds it to read what's on the screen, she says *"it feels like I get an electric shock through my arms."* She says *"Some people develop sensitivity to electricity and radiation from equipment such as mobile phones and personal computers. Whether this sensitivity can lead to serious outcomes such as cancer or other diseases, we still do not know, but I am convinced this must be taken seriously."* Laptop PCs, if unearthed, can give off high electric field levels.

Light sensitivity

Light is part of the EMF spectrum and some ES sufferers begin to tolerate some light frequencies less well, especially at the blue end of the light spectrum. People who are most severely affected by ES, also become exquisitely sensitive to daylight (porphyria), wearing tinted glasses, or even having to keep indoors during the day, only opening curtains and venturing out after dark.

Many ES people cannot tolerate the new CFL lights. They may like to explore the idea of using LED lighting, though the situation with regard to these is not straightforward, see the article on "Lighting and EMFs".

Psychological effects

Bouts of extreme rage, violence, destructiveness, irritability, feelings of hostility may develop. Feelings of depression, crying day and night, feeling unsociable, wanting to withdraw, even suicidal tendencies, are reported. Anxiety, hysteria, feeling insane, out of control, mind interfered with can follow.

Augner & Hacker (2009) reported that people living near mobile phone base stations were more strained than others and that the findings couldn't be explained by EMF-health concerns.

Skin

Skin problems are the second most frequently experienced symptoms. The skin feels dry, can go red and rashes develop. These can last for some considerable time. These are likely to be similar to the rashes resulting from allergic responses, with an increased number of mast cells in the dermis. Much of the work carried out since the early 1990s by Olle Johansson and his team at the Karolinska Institute in Stockholm, Sweden, has shown these effects (Rajkovic 2005, Johansson 2006). Johansson (2001) found an increase in mast cells in normally healthy people after exposure to a TV/PC screen for 2 or more hours.

These skin symptoms can be accompanied by tingling sensations both facially and /or over other parts of the body. A Japanese study showed that microwave radiation enhanced some allergy-induced skin wheal responses, but not all (Kimata 2002). It has been established experimentally that electrical stimulation of the hippocampal-amygdaloid complex of ES people have produced the experience of vibrations or tingling sensations.

A much-criticised (Cohen 2008) paper by Eltiti (2007), nevertheless found a statistically significant higher skin conductance in the sensitive group. This is probably because they have more permeable cell membranes.

When these cell membranes leak, they allow toxins and allergens to enter the body more easily. This may explain the current increase in multiple chemical sensitivities and allergies.

Sleep disturbance, tiredness & dizziness

Feelings of abnormal tiredness, weakness, tremor, faintness and dizziness can be experienced, possibly exacerbated by the commonly reported sleep disturbances.

Sleep problems are increasingly being reported, not just by those who report ES, but by about 10-12% of the adult population (Glasgow Sleep Research Laboratory). By their definition, a chronic insomniac is someone who spends at least 30 minutes trying to get to sleep or is awake for at least 30 minutes during the night, at least three times a week for three months. Sleep problems may well underlie many of the other adverse biological effects.

Other reactions

Sufferers may get a generalised feeling of impending influenza that never quite breaks out, or report a state of overall lower wellbeing (Zwamborn 2003). This is quiet common, especially in the early stages of becoming ES.

People may experience weight gain, low body temperature and pulse rate and lupus-like symptoms.

Some people get abdominal pressure and pain, paralysis, balance problems, body and / or muscle spasms, convulsions, confusion and sleep disturbances (Mueller, the NEMESIS Project). There is an indication that increased electrosensitivity in the evening might be associated with impaired sleep quality. Temperature changes, including a rise in the groin and rectal area, loss of libido and rectal twitching and pain may be experienced. Some develop rare diseases, such as Myasthenia or Sjogrens disease or thyroid problems (Rajkovic [2005](#), [2006](#)). People with ES may feel vibration in the walls around them, and a loss of sense of touch.

This sensitivity can extend to other senses, (hyperaesthesia) perhaps hearing sounds outside the 'normal' range, so the microwave signals from mobile phone base stations or radar or other similar installations may register as clicks, humming, buzzing, hissing or a high-pitched whine. This has sometimes been diagnosed as 'tinnitus', a misdiagnosis. The parts of the brain that are involved in the perception of tinnitus have been identified by the use of a magnetoencephalograph., which measures the very small magnetic fields generated by intracellular electrical currents in the neuron cells in the brain. This may also indicate the mechanism by which RF can create the symptom.

It has been suggested that this auditory effect could be due to a change in rigidity in the middle ear, caused by the lowering of the threshold of excitation of muscles, as microwaves can depolarise nerve and muscle cells. It also may be that the microwaves resonate within the brain cavity and the sensation is registered by the brain 'as if' it were sound. Lin & Wang ([2007](#)) suggested that a microwave pulse can be absorbed by the soft tissues in the head, and it then launches a "*thermoelastic wave of acoustic pressure that travels by bone conduction to the inner ear.*" It then "*activates the cochlear receptors via the same process involved for normal hearing.*" Earplugs will not change this way of 'hearing' microwaves, so clearly the mechanism is directly experienced by the brain, without the involvement of the ears. Landgrebe ([2007](#), [2009](#)) found that tinnitus is associated with subjective electromagnetic hypersensitivity, possibly due to an over activated cortical distress network. Microwave sickness has been identified since microwaves were first used in radar.

Many ES sufferers have immune system abnormalities. Evidence from those who also experience MCS indicates a possible link to hypothyroidism, a metabolism problem at a cellular level, possibly due to cell receptor inactivation caused by heavy metals and toxic chemicals (including pesticide exposure at an early age).

The growth of bacteria and yeasts is affected by specific frequencies.

The emission of electromagnetic fields from a small number of ES people is able to cause electrical equipment to malfunction. It is possible to record these personal fields as a static-like noise on a recording. Fields of between 0.5 Hz and 30 Hz are typically emitted; some researchers have recorded a range up to about 2,000 Hz. Such fields are emitted as coherent oscillations due to the body of that particular ES person re-radiating ambient fields. These signals can actually be large enough to produce allergic reactions in sensitive individuals nearby.

Over voltage problems have become quite common since the voltage changed in the UK from 240 volts to 230, and over voltage supplies can cause light bulbs to 'blow' more frequently. If incandescent light bulbs are affected wherever the ES person goes, without exception, then it is more likely to be due to the person.

When a person starts to show symptoms of problems after exposure to an initiator, sensitivity tends to increase and individuals claim they react to more and more kinds of electrical equipment.

In most workplaces no measures are taken in connection with ES problems, and only those people reporting more than 10 symptoms reported them as work-related injuries to the National Insurance office.

At first, the symptoms have an intermittent character and disappear after a short-term rest away from the EMF source, but for some people the symptoms become more persistent, and they have to modify their lifestyles in different ways.

One person reports "one gets used to the feelings that are present 99.9% of the time so that if I am either on the mend/recuperating (not had high exposure for a while), then I am more sensitive when I am next exposed to a significant EMF. If I am somewhat overloaded then my body seems to go into a quiescent state for a while, only to feel really rough some time later - the pay back!

Real life stories

Some of you who have told us your story will recognise your situation. Most people's real names are not given, except where they are choosing to actively campaign for recognition of this problem. Others who are experiencing ES and think they're alone will feel supported in the knowledge that other people know what it is like and may have similar symptoms.

Frans fled his apartment in the Hague due to the ES he developed there, but the new house proved to be just as bad. Although it was a reasonable distance from phone masts, he had not allowed for the effect of DECT telephones, which were much stronger than the GSM mast signals. His wife began to feel ice-cold and very tired, his daughter started itching and became hyperactive, Frans started burning. Soon, they experienced nausea, severe sweating, cognitive problems and the six year old started bed wetting. Within a few months Frans couldn't sleep at all, his skin felt as if it were burning, he was trembling and he experienced electrical sensations all over his body. He kept waking up at 3.00 a.m. with the sensation that the inside of his head had become totally fluid and was sloshing around like hot water. No one could find a disease or pathology, though the blood tests did show cell/muscle damage which he concluded was probably due to chronic exposure to EMFs.

Kathy Morris and her sister are both ES. They became chemically sensitive first. Kathy says her mother was exposed to x-rays a lot when she was a nurse in the 1940s before she and her sister were born, and wonders if this could have made her mother and her two daughters susceptible. She wished she had been aware when she developed chemical sensitivity, that the odds of developing subsequent ES were high, and she could have learned to avoid EMF sources.

Isabelle R experienced various minor "buzzings" throughout the night, then microwave shock, which paralysed her whole body, numbing her brain; the nerves/muscles in her whole body were tingling. A friend staying with her felt "buzzing" in his head, which reminded him of sensations he sometimes got when using his mobile phone.

Some people can't wear quartz wristwatches. One person experienced headaches that switched sides when he moved his watch from one arm to the other, and his ability to focus the eye on that side was affected and the muscles in that arm were weaker. Another person found the fourth finger of his left hand became numb. He changed watches to one with a much smaller and weaker battery. After two months the numbness had gone and his finger was back to normal. This sensitivity is apparently not uncommon.

Arthur Firstenberg (1997) became electrically sensitive in 1982 after he received more than 40 dental x-rays. One day he collapsed on the hospital floor with heart pains and subsequently he lost 15 pounds in two weeks. He also grew short of breath around electrical equipment. He still graduated from Cornell University with a degree in mathematics and a minor in physics.

He can detect, and reacts to, the electromagnetic fields emitted by everything from hair driers to power lines. He is president of Wireless Free Mendocino, a group that wants to ban wireless services from Mendocino, a village on California's Northern Coast. Firstenberg says he and the group are fighting to protect the health of the townspeople, but his detractors say they have created a brain drain of entrepreneurs to more 'connected' locales, bogging Mendocino down in low-paying tourism industry jobs and reducing future opportunities.

One of the targets he has been attacking is the American Telecommunications Act of 1996, which prohibits local governments from banning wireless facilities on the grounds of the environmental effects of the radio frequency emissions.

Chloe T became ES following an MRI scan and has become progressively more sun sensitive in recent years. Some of the Gadolinium salts injected into MRI subjects, as contrast enhancers, are known to be quite toxic. She now has stinging and burning sensations from the hips down. Going outdoors to do some gardening, she believes that the fading UV light really fires up her nerve endings. Derek B also reacted to an MRI scan, feeling an extreme burning sensation in his chest. Subsequently, he experienced chest pain and headaches when near an EMF source. Mary F developed ES after working with x-rays to monitor seedling growth in order to cultivate the forests of Canada. Exposure to chemicals induces the same symptoms as if she were exposed to EMF radiation. So when doctors injected her with the ionised chemical solution required to have an MRI, Mary became paralysed and to date still has to use a wheel chair to get around.

When Yumio M approaches operating electric appliances, such as microwave ovens, she suffers headaches, dizziness and tingling sensations. She went on holiday last year and stayed in a cottage equipped with an induction hob. When her friend turned the cooker on, her body was thrown backward as if she received a blow -- even though she was standing a meter away from it. She said she immediately left, but headaches, dizziness and tingling continued for about an hour.

AD can count at least 19 masts from the flat where he lives. He is irritable, unable to think straight, remember things or organise his life; he has no energy/incentive and has deep mood swings and depression. Away from the aggravating TETRA radiation, he speaks clearly and

lucidly, even with a return of his sense of humour. He is a little more positive, his energy levels improve and you can have a normal conversation with him.

David Dean, a councillor in Merton, South London, describes himself as a human antenna. *“The moment I go into people’s houses I know whether they have WiFi because my head starts to buzz. I had to leave my last job because I couldn’t stand up for more than ten minutes in the office and my boss would not remove the WiFi. My heart raced, I had double vision and really bad headaches. It felt as though my head was in an arm lock.”*

JL describes her experience of developing ES. *“I’m a very healthy person but since this has come upon me, I’ve had so many tests done, but they couldn’t find anything. They tried to narrow it down to anxiety or depression.”* Her condition means a monastic lifestyle: short trips to shops, virtually no TV, no mobile phones, or anything giving off electromagnetic radiation.

ML first noticed something was wrong when she began to suffer from insomnia, and headaches when she used her cordless phone. She developed sensitivity in her breasts. Eventually using the computer began to provoke her symptoms, even going shopping where there were fluorescent lights or fridge/freezers. Hospital visits to attempt to get a diagnosis made her ill for days, because of the electronic equipment that was used. She cannot fly to visit her family as aeroplane travel makes her sick.

Christina N’s ES was initiated when she was on holiday when there was a violent electric storm. She has been subject to severe pain whenever she is in contact with electricity for the twenty years that have followed this exposure, and has to have her shoes especially lined so she does not feel pain whilst out walking, when she may step over underground cables.

Melvin became rapidly ill after being exposed to fluorescent lighting and a high number of computers, CTR and LCD screens at work for 2 years. His main symptoms were dry burning eyes and face. From the first symptoms to his being too ill to work was only 3 months. He took supplements and homoeopathic medication and after a year could begin to use a computer again, with keyboard and mouse extensions to keep the equipment well away from him. *“All the usual activities of life have to go on, trying to make a living (surveyor), though my wife is now our principal earner, doing extra hours as a nurse. Today a giant mast at my son’s football ground did for me after 20 minutes. Now I anticipate two or three days of chronic difficulty with all the usual symptoms and I cannot even rest up at home as the neighbour now has a WiFi connection which is irradiating our entire house. We had an electronics engineer in and measured it, I really do not know which way to turn, and I am told I am deluded and imagining it.”*

This is not an uncommon story, and it clearly shows a distressing limitation on the person’s life.

There are few tests that can be done as yet to predict or diagnose ES, although Professor Belpomme, see pages 3 & 4 has suggested possibilities that need to be followed up. The next section looks at some of the ideas that have been proposed in an attempt to cast light on the mechanisms by which biological systems interact with EMFs.