

ELECTROSENSITIVITY - OVERVIEW

Electrosensitivity is the condition of being physically affected by radio frequency radiation, voltage transients ('dirty electricity', VLF), and/or power lines and ELF.

- **Radio frequency radiation (RFR)** is emitted by mobile phones, phone masts, Wifi, smart meters, Bluetooth, Fitbits, radio and TV masts etc.
- **Voltage transients** ('dirty electricity') and very low frequency can be emitted from induction cooker hobs, battery chargers, CFL and some LED lights etc.
- **Power lines** (extremely low frequency) emit electric and magnetic fields (EMFs), as do transformers, electric motors, hair dryers, shavers and washing machines.

Electrosensitivity is a spectrum condition:

- Everyone is electrosensitive since all cells in the body can react subconsciously to magnetic and electric fields.
- Some people are more consciously sensitive than others.
- Some people become hyper-sensitive and are severely disabled by this environmental condition.

Electrosensitivity is also called:

- Electromagnetic Intolerance Syndrome
- Environmental Intolerance
- Microwave Sickness
- Radio Wave Sickness

Electrosensitivity covers a wide range of conscious and subconscious reactions, like other environmental allergies or sensitivities, such as to particular foods, pollens or amounts of sunshine.

- The conscious adverse symptoms of Electrosensitivity (ES), like headaches, physical weakness and muscular pains, were first recorded from 1733 by scientists researching the effects of electricity.
- More disabling Electromagnetic Hypersensitivity (EHS) was first recorded in 1746.
- In the 19th and early 20th centuries telegraph lines, electricity supplies and radio caused conscious symptoms among workers. Simultaneously, most people were affected subconsciously by the 'diseases of civilisation'.
- Since then, conscious effects, and subconscious ones like disturbed sleep, cancers, infertility and heart problems, spread more widely, with computers, mobile or cordless phones, Wifi and smart meters.

HISTORY: SCIENCE

1733: ES: non-thermal adverse symptoms, EMF
1746: EHS: hypersensitivity specific symptoms, EMF
1893: ES: specific non-thermal adverse symptoms, RFR
1930: Non-thermal effects primary, heating secondary
1932: EHS: hypersensitivity specific symptoms, RFR
1945: ES symptom of cancer from non-thermal RFR
1945: Non-thermal RFR used by military in warfare
1991: ES shown in provocation tests, screened subjects
2000: More brain tumours on side of head near phone
2002: More ES symptoms near mast than further away
2003: Risk of cancer x 3 nearer mast than further away
2014: Genetic variants associated with EHS
2015: Cerebral blood hypoperfusion in people with EHS
2017: 3d fMRI scans show brain damage in EHS people
2018: NTP study confirms mobile phones cause cancer
2019: 'Bystander' RFR effect, like ionising radiation
2019: Subconscious human magnetoreception shown
2022: Ecological assessment confirmed proof of EHS
2022: Severe EHS symptoms shown near 5G mast

HISTORY: REGULATORY

1935: First RFR guidelines, non-thermal and thermal
1974: Health & Safety at Work Act protects ES workers
1990s: Insurers: RFR high risk only, like cancer asbestos
2001: IARC classifies ELF EMF as a 2B cancer agent
2001: Geneva: mast dismantled, residents compensated
2002: WHO/ICNIRP recognise 'sensitive' ES people
2006: UK employers remove RFR for ES people
2009: EU Parl.: biological, not ICNIRP heating, limits
2009: EU Parl.: protect EHS and grant them equality
2010: Equality Act protects people disabled by ES
2011: IARC classifies RFR EMF as a 2B cancer agent
2012: NHS GPs and consultants diagnose physical ES
2012: Courts accept ES and award compensation/fines
2013: H&SC Act: local authority duty to improve health
2021: US Court: FCC must assess non-thermal effects
2021: Court: ES person is interested party in siting mast
2022: US city bans phone mast to prevent ES symptoms
2022: UK court: removal of Wifi/phones for EHS person
2022: US: \$187,300 for RFR injuries to Havana officials

Radio Frequency Radiation - Adverse Biological Effects		uW/m²
See: Arthur Firstenberg, Some Biological Effects of Radio Waves , 2022		
Biological Effects	Genetic alterations - E. Coli	0.0000000000000001
	Human sensitivity	~ 0.00000000000001
	Altered EEG	0.000000000001
	Immune effects - mice	0.00000000001
Background Level		~ 0.0000000001
Adverse Biological Effects	Conditioned 'avoidance' reflex - rats	0.00000001
	Premature aging - pine needles	0.000000024
	Smaller growth rings - trees	0.000000024
	100 yards from home Wifi	0.0000004
	Disturbed sleep, abnormal blood pressure, digestive problems, weakness, pain, anxiety	0.000002
	Growth inhibited - beans	0.0000027
	100 yards from a mobile phone, peak power	0.000004
	1 mile from a mobile phone mast	0.00001 - 0.0001
	Disturbed metabolism, structural changes: liver, spleen, testes and brain - rats, rabbits	0.00006
	Slowed heart, changed EEG - rabbits	0.00006
	Irreversible infertility - mice	0.00017
	Childhood leukaemia, <12 km from TV mast	0.0002
	Impaired motor function, memory and attention; altered sex ratio (fewer boys)	0.0003
	Blood-brain barrier impaired by mobile phones	0.0004
	Altered calcium flux in brain tissue	0.0006
	Tinnitus, buzzing and other auditory effects	0.0002
	Leukaemia, skin melanoma and bladder cancer, near TV and FM mast	0.0005
	Head and chest exposure from a laptop on a table	0.0008
Metal redistributed in the lungs, brain, heart, liver, kidney, muscles, spleen, bones, skin	0.001	
International Scientific Limits: Bionitiative, Building Biology, EUROPAEM, IGNIR, Seletun		0.1 - 100
Adverse Biological Effects	Head and chest exposure from a mobile phone on a table	0.15
	Exposure to genitals from a laptop on the lap	17.0
	Exposure to brain from a mobile phone against the brain	20.0
ICNIRP: Arbitrary, unscientific, unprotective, thermal-only limits, averaged over 6 or 30 minutes		≤40,000,000

ABBREVIATIONS

ASSESSMENTS	LED light-emitting diode	PHYSICAL AGENTS
EIA environmental impact assessment	ONT optical network terminal	CME coronal mass ejection (<i>geomagnetic field</i>)
HRA health risk assessment	SM (wireless) smart meter	EF electric field
CONDITIONS	METRICS, NON-THERMAL	ELF extremely low frequency
CFS chronic fatigue syndrome	G-S Graham-Stetzer (<i>transients</i>)	EMF electromagnetic field
EHS electromag. hypersensitivity	Hz Hertz (<i>frequency, cycle per sec</i>)	GEC global electrical circuit (<i>atmospheric electricity</i>)
EI environmental intolerance	kHz kiloHertz (<i>frequency</i>)	MF magnetic field
ES electrosensitivity	mG milliGauss (<i>magnetic field</i>)	RFR radio frequency radiation
FI functional impairment	MHz megaHertz (<i>frequency</i>)	VHF very high frequency
HS Havana (EHS) Syndrome	nT nanoTesla (<i>magnetic field</i>)	VLF very low frequency
MCS multiple chemical sensitivity	THz teraHertz (<i>frequency</i>)	
ME myalgic encephalomyelitis	V/m Volts per metre (<i>electric field</i>)	PRINCIPLES
MS multiple sclerosis	METRICS, THERMAL	ALARA as low as reasonably achievable
MWS microwave sickness	dBm decibel-milliWatts (<i>each 3: x2</i>)	HFP health first principle
DEVICES	SAR specific absorption rate (<i>heat</i>)	NOEL no observable effect level
ATA analogue telephone adaptor	uW/m ² microWatt per metre squared (<i>power density, heating</i>)	PP precautionary principle
CLF compact fluorescent light	W/kg Watts per kilogram (<i>SAR heat</i>)	

CONSCIOUS SPECIFIC SYMPTOMS

- Anxiety
- Asthma
- Cancer
- Confusion
- Cramp
- Depression
- Diarrhoea
- Dizziness
- Fatigue
- Hair loss
- Headache, brain pain
- Heart palpitations
- Indigestion
- Irritability
- Light sensitivity
- Memory loss
- Menstrual changes
- Muscle/nerve pains
- Nausea
- Noise sensitivity
- Nosebleeds
- Restless legs
- Sinusitis
- Skin rashes
- Sleep disturbance
- Smell sensitivity
- Thirst, Tics, Tinnitus
- Visual effects

SUBCONSCIOUS SYSTEMIC EFFECTS

- Brain wave disturbance, especially Alpha
- Cancer: bioelectrical dysregulation, DNA breaks
- Cell cycle disturbance, mitochondrial dysfunction
- Cell membrane depolarisation, ion channel effects
- Fertility reduced, changes in offspring, more females
- Heart: changes to rate, variability, cerebral perfusion
- Immune system changes: chronic inflammation
- Nervous (peripheral and central) system effects:
 - Demyelination, axonal and microglia
 - Hippocampus: enzymes, proteins
 - Hormonal: cortisol, testosterone
- Skin: mast cell degranulation, allergic sensitivity

CAUSES

- Bluetooth, TETRA, Wifi
- CFLs, LEDs, transients
- Cordless DECT phones
- Mobile phones, masts
- Powerlines, transformers
- Smart meters, Fitbits

MECHANISMS

- Cilia. Hairs. Cryptochromes
- Demyelination. DNA signalling
- Genetic variants. Glial/synapses
- Magnetite. NALCN. Pineal gland
- Radical pair mech. Retina. SCN
- Voltage-gated ion channels

PATHWAYS (like some Ultrasound effects)

- Antioxidant glutathione. Metabolism
- GABA. Hormones: melatonin, thyroid
- Metal implants, dental amalgam, fluoride
- Oxidative stress (like ionising radiation)
- Protein expression: ERK, Hsp70, p53 etc.
- Signalling: Ca, CaSR, NMDA, T cells, TGF

ILLNESS AND FUNCTIONAL IMPAIRMENT FROM EHS

- Electrical Hypersensitivity (EHS), established since 1746, is an environmental systemic spectrum syndrome.
- EHS is caused by the patient's exposure to RFR/EMF.
- EHS makes people ill with a range of symptoms which vary as the condition and its causes change in severity.
- Symptoms are disabling, causing functional impairment under the Health & Safety 1974 and Equality 2010 Acts.

EHS SYNDROME: CLINICAL DIAGNOSIS

- Clinical history: cause/effect from exposure/symptoms.
- The absence of symptoms when the RFR/EMF source is removed (positive reverse provocation testing).
- Multiple biomarkers, but only a few may be elevated or suppressed, depending on the precise stage of the illness.
- Brain blood perfusion and 3d fMRI scans, where the potential benefits outweigh health risks of an MRI scan.

PREVALENCE IN UK 67m POPULATION

- 0.65%, 435,500 people: work restricted because of EHS
- 1.2%, 800,000 people: severe electrical hypersensitivity
- 3.6%, 2.4m people: moderate electrical sensitivity
- 100% subconsciously sensitive (80% chronic inflammation)

TREATMENT: AVOIDANCE OF RFR/EMF

- Avoid RFR: e.g. masts, mobiles, smart meters, Wifi
- Keep: 10m from mobiles in use, 100m from Wifi
- Live: 500m from masts, 600m from powerlines
- Protect sleep: e.g. military nets, shielded rooms.

NON-IONISING (RFR/EMF) and IONISING RADIATION

Both cause oxidative stress and cancer; sensitivity varies. 24 hours of mobile phone harms DNA like 1,600 X-rays. Both: primary non-thermal effects, thermal secondary. Both: hormetic (change low/high dose), no threshold.

RESEARCH INTO ES AND EHS

ES research started in 1730 at the Royal Society, London. Centres for research into ES and EHS include: ARTAC Paris, Breakspear Herts, EMC Dallas USA, DARPA Caltech USA, HUSM Lleida, CES Moscow, UC San Diego USA, Toronto WCH, JMU Virginia USA.

NATURAL RFR/EMF EFFECTS

All life in the Earth's biosphere is electrically sensitive to natural geomagnetic and global electrical circuit changes at levels far below most man-made electrosmog.

ICD-10 CODES

- ICD-10: W90.0 (RFR); W90.8 (ELF); Z58.4 (radiation).
- EHS, known since 1746, still lacks its own ICD-10 code.

MAINSTREAM

NON-THERMAL & THERMAL SCIENCE

- scientifically based proof, from evidence
- established long-term and short-term non-thermal and heating adverse effects, known since 1733
- protective: prevents ES symptoms, e.g. cancer, EHS
- protective of all wildlife in earth's biosphere
- mainstream, independent, unbiased scientists.

INTERNATIONAL PROTECTIVE SCIENTIFIC GUIDELINES

Bioinitiative 2012,
 Building Biology (sleeping areas) 2015,
 EUROPAEM 2016,
 IGNIR 2018,
 Seletun 2010

IMPARTIAL MAINSTREAM ORGANISATIONS USING ESTABLISHED SCIENTIFIC EVIDENCE

These organisations include experts on real ES.

- Bioinitiative Group <https://bioinitiative.org>
 EHT: Environmental Health Trust, USA <https://ehtrust.org>
 EMF Scientist: International EMF Scientist Appeal [link](#)
 EPA: Environmental Protection Agency, USA
 ES-UK: Electrosensitivity UK <https://www.es-uk.info>
 EUROPAEM: European Acad. for Environ. Medicine [link](#)
 IARC: International Agency for Research on Cancer [link](#)
 ICBE-EMF: International Commission on the Biological Effects of Electromagn. Fields (ICBE-EMF) icbe-emf.org
 ICEMS: Internat. Commission on EM Safety www.icems.eu
 IEMFA: International EMFs Alliance <https://www.iemfa.org>
 IGNIR: Internat. Guidelines on Non-I. Rad. <https://ignir.org>
 NTP: National Toxicology Program, USA [link](#)
 PHIRE: Physicians' Health Init Rad. & Envir. phiremedical.org

ARBITRARY, UNSCIENTIFIC THERMAL-ONLY 1953 MYTH

- arbitrary and unscientific claim: no proof, no evidence
- based on Schwan's invalidated short-term heating-only myth of 1953, confirmed as unscientific in 1957
- unprotective, allowing ES symptoms e.g. cancer, EHS
- unprotective of all wildlife in earth's biosphere
- used as a 'front' for the radiation industry cartel.

ARBITRARY, UNPROTECTIVE THERMAL GUIDELINES
 FCC 1998, ICNIRP 2020

'FRONT', 'SHAM' AND SINGLE-VIEWPOINT GROUPS, UNPROVEN DENIALS, 'JUNK' OR FLAWED SCIENCE

Meetings are often in secret or without full public records.

They have no experts on real ES, only the different EPh.

- DHSC: Depart. for Health & Social Care; agency: UKHSA
 - UKHSA: Health Secur. Ag.; under DHSC; advises Ofcom/DCMS
 - COMARE: Com.on Med.Aspects of Radiat. & the Envir.
 - AGNIR (1990-2017): Public Health England (PHE)'s Advisory Group on Non-Ionising Radiation, under DHSC
 FCC: Federal Communications Commission, USA
 GLORE: Global Coord. of Res. & Health Pol. on RF EMFs
 ITU: Internat. Telecommunications Union: UN agency
 SCHEER: Eur.Comm: Sci. Comm. on Health Env & Em Risk
 ICNIRP: Int. Com. on Non-Ioniz. Rad. Prot.: WHO agency
 WHO: World Health Organizat. EMF Project: UN agency
 WHO is subject to Int. Atomic Energy Agency (IAEA);
 IAEA is subject to Int. Comm. on Radiol. Prot.(ICRP)

WHO WRONG: CONFUSES EHS AND EPH

WHO Backgrounder 296 (2005) confuses two different conditions, (a) physiological EHS, known since 1746, and (b) psychological EPh (Electrophobia, IEI-EMF), a nocebo effect known since 1903. EPh's prior conditioning cannot apply to how children and unaware adults develop EHS.

Radio Frequency Radiation Guidelines							
	Background level	Non-thermal and Thermal			Thermal only		
		Long- and short-term, 4- >24 hours			Short-term only, 6 - 30 minutes		
		Peak			Averaged		
		Scientific			Arbitrary, Unscientific		
	Safe for humans	Protective for most humans			Unprotective for humans		
	Safe for wildlife	Includes some wildlife			Excludes wildlife		
	Johansson et al. 1997	USSR 1935	Bioinitiative 2012	EUROPAEM, IGNIR 2016, 2018	USA Schwan 1953	USA, ICNIRP 1982, 1998	ICNIRP, WHO 2020
V/m	~ 0.0000002	6	0.03 - 0.05	≤ 0.002 - 0.2	194	61	≤ 123
uW/m ²	~ 0.0000000001	100,000	3 - 6	1 - 100	100,000,000	10,000,000	≤ 40,000,000
dbm	< -90	-1	-46 to -43*	≤ -70 to -31*	+ 29	+ 19	≤ + 25
W/kg	< 0.00002	Seletun	2010	0.0003	1980, 1984	0.08 whole body, 1.6/2.0 head, 4.0 limbs	

*The threshold for mobile phones (5G, 4G, 3G) is lower, at -100 dBm.

Further information: www.es-uk.info