

Electro-Hypersensitivity Does Not Exist

Complete Submission — Contents

Comment submitted in response to the U.S. Department of Health and Human Services (HHS)
*Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and
Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Document 1 — The Ubiquity of Waves	2
Document 2 — Europe and Exposure Standards	14
Document 3 — Measuring Waves	28
Document 4 — Recognition of Electro-Hypersensitivity and Sensitive Populations	41
Document 5 — Technologies and Infrastructure	54
Document 6 — Fauna and Flora	68
Document 7 — Supplementary Information	80
Document 8 — The Medical Profession and Electro-Hypersensitivity	93
Document 9 — Electro-Hypersensitivity in Brief, for Primary Care Physicians	114
In Conclusion	128

Each entry is a link. Page numbers refer to this complete file; each part keeps its own page numbering in its footer.

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Document 1 — The Ubiquity of Waves: Network Densification, the Erasure of White Zones, and the Condition of “Wave Refugees” in Europe

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 3; 11g; 15a, 15b, 15c; 18.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

Drawing on European sources, this document describes how the radiofrequency environment to which the population is exposed has changed, and its consequences, particularly for the most receptive individuals, referred to here as electro-hypersensitive. It establishes three findings.

First, exposure to artificial high-frequency waves has become continuous: ambient levels have risen sharply since 1980, mobile networks are becoming denser, and national attention thresholds are being raised to keep pace with this densification.

Second, public policies for territorial coverage, including France’s 2018 New Deal mobile, are gradually eliminating the last areas without network coverage, which, for the electro-hypersensitive, are the only places where life remains possible.

Third, the result is a population of “wave refugees,” forced into displacement and precarious housing and, ultimately, into a de facto house arrest, through the inability to travel, and without guaranteed access to hospital care.

The document compares this situation with that of the United States, where the National Radio Quiet Zone in effect offers a refuge, and sets out four recommendations.

1. Purpose

The HHS Request for Information asks what types of scientific evidence should be considered when evaluating RF exposure associated with wireless infrastructure, in particular with regard to

proximity to homes, cumulative neighborhood exposure, and antenna density (Question 15), and invites those most directly concerned to describe their experiences (Question 3). It also asks about the situation of populations that may uniquely experience adverse effects (Question 11g).

This document answers from a European perspective. It does not address biological effects as such, which are covered in Documents 2, 4, 6, and 8, but the organization of the territory: the way in which network densification transforms the living conditions of the most sensitive human beings.

By electrosensitivity we mean a sensitivity to electromagnetic fields common to all human beings, to varying degrees, and by electro-hypersensitivity its highest degrees, which make life impossible in an exposed environment.

The name itself is debated. Ten to fifteen designations coexist worldwide for the same condition: electrosensitivity, electro-hypersensitivity, microwave syndrome, and, at the World Health Organization and Anses, “idiopathic environmental intolerance attributed to electromagnetic fields,” whose terms place the cause on the individual, or declare it unknown. In the United States, the OneName Project, launched on January 8, 2024, by five advocates, including the president of Environmental Health Trust, convened an eleven-member decision-making committee—physicians, scientists, a lawyer, and advocates from the United States, Canada, and Europe—which on December 10, 2024, chose the name *Electromagnetic Radiation Syndrome*, or *EMR Syndrome* for short, because it “places responsibility where it belongs—on environmental EMR exposure—not on the individual”; several American organizations have adopted it since ([OneName Project, 2025](#)). In these documents we use “electro-hypersensitivity,” the term in use in Europe, and, like the OneName Project, we regard it as a syndrome: a set of reactions of the body to an external source, not a disease.

2. Methods and Sources

The data gathered come from a documentary working database built since June 2026, in which each entry states its sources and their reading status. They are of four kinds: public data from the regulatory authorities (the French National Frequency Agency, ANFR; the French telecommunications regulator, Arcep); peer-reviewed publications; institutional texts (Council of Europe, prefectural orders, the referral to the French Defender of Rights); and advocacy and press sources, whose position is stated. The ANFR and Arcep data were consulted in their publications and online files, with the exception of the review of the New Deal mobile, cited from the press. The referral to the Defender of Rights, the Robin des Toits press release, and the video by [Milbert \(2016\)](#) are cited from our files, which reproduce their text or the relevant passages; the association pages and press articles were consulted online. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document. The court decisions mentioned are reported from the sources indicated. Private individuals are not named. Paragraph 8.1.4 of Council of Europe Resolution 1815 was checked against the adopted text on October 19, 2026.

3. The Densification of Radiofrequency Exposure (Questions 15b, 18)

3.1 Changes in Ambient Levels

In 1980, the U.S. Environmental Protection Agency (EPA) measured ambient radiofrequency levels at 486 sites in fifteen U.S. cities (Tell and Mantiply, 1980). An international study conducted in 94 microenvironments in six countries revisited one of those sites, in Los Angeles, and measured mean levels there seventy times higher than in 1980, with mobile telephony infrastructure as the leading contributor (Sagar et al., 2018, cited in Levitt et al., 2022).

3.2 Network Deployment in France

As of January 1, 2026, ANFR listed 71,344 authorized 4G sites and 53,718 authorized 5G sites in France (ANFR, 2026a); as of July 1, 2026, more than 55,600 5G sites were authorized (ANFR, 2026b). The 5G licenses require coverage of highways in 2025 and of main roads in 2027, and a throughput of at least 240 Mbit/s at all sites in 2030 (Arcep, 2019; see Document 5, Section 3.2).

3.3 Changes in Attention Thresholds

In France, the regulatory exposure limit for the public depends on frequency and reaches 61 V/m. Until 2025, a level above 6 V/m indicated an “atypical point,” calling for remediation by the operators. ANFR raised this threshold to 9 V/m throughout the territory as of January 1, 2026 (Devillers, 2026), on the grounds that the 6 V/m threshold “no longer appears suitable in a context of densification of mobile networks in cities” (ANFR, 2025). The attention threshold was thus adjusted to exposure, and not the other way around.

3.4 A Change in the Configuration of Sources

Radio and television broadcasting relied on a small number of powerful transmitters, located far from the public. Home Wi-Fi, connected devices, smart meters, and 5G small cells replace that model with a multitude of lower-power sources, installed as close as possible to users. Moreover, exposure is not limited to the field from base station antennas: where that field is weak, in rural areas, the user’s phone transmits more to maintain the link, as two recent studies conducted on French and Korean networks show (Liu et al., 2026; Lee et al., 2026). Our own observations, reported in the deposit text, bear witness to this from the second half of the 1990s onward.

4. The Erasure of White Zones: The New Deal mobile (Questions 15a, 15c, 18)

4.1 A Term with Two Meanings

In regulatory vocabulary, a “white zone” (*zone blanche*) refers to an area with no mobile coverage at all, which public policy aims to eliminate. In the vocabulary of the electro-hypersensitive, it refers to a place almost free of artificial radiation, which, on the contrary, must be preserved. This semantic collision sums up the conflict: what territorial planning seeks to eliminate is precisely what the electro-hypersensitive most need in order to live.

4.2 The Scheme and Its Results

The New Deal mobile, concluded in January 2018 between the French State and the four mobile operators, renewed the operators' frequency authorizations without a new auction, in exchange for coverage commitments, including 5,000 new sites in poorly covered areas. According to the review published by Arcep on February 1, 2024, the share of the territory in a 4G white zone fell from 11% in 2018 to 1.9% at the end of 2023; more than 2,600 sites of the targeted coverage scheme were in service as of September 30, 2023 ([Marzolf, 2024](#); [Maire-info, 2024](#)). The Association Zones Blanches (White Zones Association) observes that this agreement has “greatly multiplied the number of base station antennas on French territory,” making it more difficult to identify the living places free of electromagnetic fields that the electro-hypersensitive need ([AZB, 2023](#)).

4.3 Case Study: Two Valleys in the Vosges

The survey carried out on August 24, 2026, of the public data of Arcep and ANFR, and of the New Deal mobile list of “areas to be covered” ([Arcep, 2026](#); [ANFR, 2026c](#)), concerns two neighboring valleys in the Haut-Rhin department. On that date, the first had no antenna within its municipal territory and appeared on the scheme's list as an area to be covered (one site requested, none in service); the quarterly file of the scheme published by Arcep on September 24, 2026, however, reports as brought into service a site intended for a second area bearing the name of the municipality, near the summit of the Grand Ballon (according to our files; not cross-checked on Cartoradio). In the second valley, a 20-meter tubular tower, shared by the four operators, was built on October 16, 2024, within the boundaries of the Ballons des Vosges Regional Nature Park ([ANFR, 2026c](#)). An electro-hypersensitive individual noted in August 2026 that this tower is disguised as a fir tree; this camouflage does not appear in any of the public sources consulted. The case illustrates the advance of the scheme even into protected natural areas and the lack of information given to local residents (Question 9, addressed in Document 3).

4.4 No Protection for Travel

No arrangement currently protects the movement of the electro-hypersensitive, and no mobility corridor exists. The only territorial planning instrument concerned, the New Deal mobile, pursues the opposite objective: filling in the last uncovered spaces.

5. Wave Refugees (Questions 3, 11g)

5.1 Definition

We call “wave refugees” (*réfugiés des ondes*) the electro-hypersensitive human beings who seek a refuge and change their place of living to find one, as the networks expand. The expression is also used elsewhere, notably by a website devoted to electro-hypersensitivity, which describes these refugees as “prisoners of their homes, when their homes can still offer them a refuge” ([zerowavezone.com, 2025](#)).

5.2 Documented Trajectories

As early as 2012, members of the future Association Zones Blanches came to the aid of two electro-hypersensitive women who had taken refuge in a cave in the Hautes-Alpes department; their situation moved Member of the European Parliament Michèle Rivasi, who brought together around her the future board members of the association (AZB, 2026). This situation lies at the origin of the Association Zones Blanches, founded in December 2014, and of a project for the first European medical and social reception center for the electro-hypersensitive and the chemically sensitive, on a 63-hectare estate. The project was not carried out. In 2023, the association observed that “to this day, there is no public place in France where individuals who have become electro-hypersensitive (EHS) and/or chemically sensitive (MCS) can be sheltered” (a quotation recorded in our files, which we have not found on the association’s current website).

In 2015, an electro-hypersensitive individual settled in a state forest in the Alpes-de-Haute-Provence department that had no mobile coverage. The commissioning of an antenna there was announced for January 2024. In proceedings brought by the National Forests Office, the Digne-les-Bains Judicial Court recognized, on February 22, 2024, his right to remain on site, on the grounds that his condition did not allow him to live anywhere other than in a white zone; the Aix-en-Provence Court of Appeal overturned this judgment on April 29, 2025, relying on the 2018 report of Anses, the French Agency for Food, Environmental and Occupational Health & Safety (Devillers, 2025), and the individual concerned brought the case before the European Court of Human Rights in 2025 (according to our files).

In the summer of 2026, the Gironde prefectural order of August 4, 2026, prohibited unrestricted access to the forest areas, except for residents, because of the risk of fire (Gironde Prefecture, 2026). The association Robin des Toits points out that the authorities have overlooked a problem, “that of electro-hypersensitive individuals who, for lack of anything better, have taken refuge in the forests out of vital necessity,” and calls for them to be given “a place to live sheltered from all electromagnetic radiation” (Robin des Toits, 2026).

In Belgium, the head of an association that makes and delivers protective bed canopies reported, in May 2026, the case of a woman whose daughter “cannot bear being in the house because of the waves. she goes to sleep in the cellar” (Lerat, 2026a). The same association head told us that he previously received about one request for help per month, and that he now receives at least one per day (personal communication, September 2026).

Our own trajectory, set out in the deposit text, belongs to the same category: departure from Belgium, a survey of white and gray zones between Belgium and the south of France in 2019, successive moves ending in a withdrawal to a plot of land in the mid-mountains, a last refuge.

5.3 Precarious Places of Shelter

The existing places of shelter are few, most often private, and rarely lasting. In France, a reception area in a white zone, in the Haute-Saône department, is reserved for members of the association that manages it, which lists the departmental council among its partners (AEPOH, 2026); a few

private refuges operate without electricity or telephone, one of which, opened in 2018 in the Dolore gorges, was hosting five residents at the time of the report, some year-round, others for a few weeks or a few months. Its founder sums it up: “The EHS are normal human beings and want a corner of their own” (Goutelle, 2025). In Belgium, the association “Un lieu de vie pour EHS” (A Place to Live for EHS), whose house in a white zone was sold in March 2026 (according to our files), wrote on August 31, 2026, that it is “no longer a place of shelter” (Lerat, 2026b).

6. Mobility and Access to Care: A De Facto House Arrest (Questions 3, 11g, 18)

6.1 The Referral to the Defender of Rights

On October 20, 2022, nine French associations referred the situation of the electro-hypersensitive with regard to mobility to the Defender of Rights (CNAFAL et al., 2022). Public transportation has become inaccessible to them, because of passengers’ smartphones and on-board Wi-Fi. Only the private car remains, provided it is neither electric nor hybrid and takes the least covered secondary roads; according to the signatories, the communicating equipment made mandatory on new vehicles from July 2022 further reduces this possibility, without the buyer being able to know its emissions. The signatories conclude: “When it is no longer possible to travel, this amounts to a measure of de facto house arrest.” They add: “The discrimination we denounce unfortunately has no legal basis, but it is a de facto situation.”

Our own situation is an example: short distances remain feasible, but long ones are closed — air travel, large cities, the seaside, museums — and returning to our country of origin, Belgium, has become impossible for us.

6.2 Hospitalization and Residential Care for Older Adults

According to a physician who has followed electro-hypersensitive patients, “most [of the electro-hypersensitive] cannot be hospitalized,” because of staff phones, DECT cordless phones, and Wi-Fi, even in patient rooms (Milbert, 2016). Other countries show that a different organization is possible: Sweden has set up health care facilities where electromagnetic fields are very low (Sears, 2007), and Switzerland applies, in places of sensitive use, including hospitals, installation limit values about ten times lower than the immission limit values (Ordinance on Protection against Non-Ionising Radiation, ONIR; Swiss Federal Council, 1999). Regarding admission to retirement homes, we found, in France, neither studies nor practices adopted by facilities.

7. Elements of International Comparison (Questions 15, 18)

7.1 The National Radio Quiet Zone

The National Radio Quiet Zone, established in 1958 to protect radio astronomy observations at Green Bank and the radio receiving facilities of the U.S. Navy at Sugar Grove, West Virginia, covers approximately 13,000 square miles, or about 34,000 km² (Green Bank Observatory, 2026). It was not created for health reasons; several dozen electro-hypersensitive individuals have nevertheless

settled there, and they themselves estimate that there are at least 75 of them in Pocahontas County alone (Andrews, 2024). The United States thus has, in effect, a territory that functions as a refuge.

7.2 European Initiatives

In Europe, we identified only one comparable municipal decision taken on health grounds. In February 2022, the municipal council of Tintigny (Belgium) decided unanimously to “preserve white zones on the territory of the municipality for the benefit of electro-hypersensitive individuals” and not to authorize any antenna near the site concerned (Hanotiaux, 2023). In France, the Haute-Saône reception area mentioned above (Section 5.3) lists the departmental council among its partners, although we have not been able to establish the nature of this commitment. In Germany, a map maintained by a private individual lists, according to its own description, 5,546 low-exposure places, mostly located in open countryside and far from homes: these are places to rest, not places to live (diagnose:EHS, 2025).

7.3 Council of Europe Resolution 1815

On May 27, 2011, the Parliamentary Assembly of the Council of Europe recommended that member states “pay particular attention to ‘electrosensitive’ people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network” (Council of Europe, 2011, § 8.1.4). The French coverage policy launched seven years later pursued the opposite objective.

8. Discussion

The three findings follow from one another. Network densification and the multiplication of sources close to the body make exposure continuous, and attention thresholds follow this densification instead of containing it. At the same time, the New Deal mobile is eliminating the last low-exposure places: all that remains for the electro-hypersensitive is to move, as the networks expand, until they can no longer move at all. This development runs counter to paragraph 8.1.4 of Council of Europe Resolution 1815, which called for the creation of areas not covered by wireless networks. The National Radio Quiet Zone shows that a territory shielded from radiation can be established and maintained over the long term, even though that was not its purpose. Since emissions add up, domestic sources included, the protection of the electro-hypersensitive can rest neither on a few private refuges nor on the preservation of white zones alone: it requires both the reduction of exposure at the source throughout the territory and the preservation, and even the re-creation, of very-low-exposure zones.

9. Limitations

The findings of this document rest on public regulatory data for network densification and the erasure of white zones, and on advocacy, press, and field sources for the situation of the electro-hypersensitive. To our knowledge, there is no census of wave refugees in Europe: the trajectories presented are documented cases, not a representative sample. Arcep’s review of the New Deal

mobile is cited from press reports. The Vosges case study is a one-time survey. These limitations themselves point to a surveillance gap that Question 10 of the Request for Information invites us to fill.

10. Recommendations (Questions 3, 11g, 15, 18)

1. Reduce exposure at the source throughout the territory, domestic sources included, since emissions add up.
2. Preserve the white zones that remain and re-create others, by designating and protecting very-low-exposure zones dedicated to human health, on the model of the protection granted to Green Bank for radio astronomy, in accordance with paragraph 8.1.4 of Council of Europe Resolution 1815.
3. Once exposure has been reduced at the source throughout the territory, provide low-exposure travel routes, which cannot substitute for that reduction.
4. Provide very-low-exposure rooms in care facilities and in residential facilities for older adults, in addition to reducing exposure at the source.

Glossary

Term	Meaning
4G, 5G	Fourth and fifth generations of mobile telephone networks.
AEPOH	Association pour un espace protégé des ondes hertziennes (Association for a Space Protected from Hertzian Waves): French association that manages a reception area in a white zone in Haute-Saône.
ANFR	Agence nationale des fréquences (French National Frequency Agency): French public body responsible for managing radio frequencies and monitoring public exposure to waves.
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
Arcep	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (French Regulatory Authority for Electronic Communications, Postal Affairs and Print Media Distribution): independent French administrative authority which, among other things, sets the coverage obligations of operators.
Atypical point (<i>point atypique</i>)	In France, a place where the exposure level exceeds the threshold set by ANFR — 6 V/m until 2025, 9 V/m since January 1, 2026 — and calls for remediation by the operators.
AZB	Association Zones Blanches (White Zones Association): French association founded in December 2014 to create places of shelter for the electro-hypersensitive and the chemically sensitive.

Term	Meaning
Cartoradio	ANFR mapping website that lists authorized radio sites and publishes the results of exposure measurements.
Chemical sensitivity, multiple chemical sensitivity (MCS)	Syndrome of symptoms affecting several organs upon exposure to various chemical substances at concentrations well below those that affect the general population.
CNAFAL	Conseil national des associations familiales laïques (National Council of Secular Family Associations); French family association, first signatory of the 2022 referral to the Defender of Rights.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
Court of appeal (<i>cour d'appel</i>)	French second-instance court, which retries cases already decided at first instance.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
Defender of Rights (<i>Défenseur des droits</i>)	Independent French administrative authority responsible, among other things, for combating discrimination and defending the rights of users of public services.
EHS	Abbreviation of “electro-hypersensitive” or “electro-hypersensitivity,” used by associations and in several quotations.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
EPA	Environmental Protection Agency: U.S. federal agency for environmental protection.
European Court of Human Rights	Court of the Council of Europe, sitting in Strasbourg, responsible for ensuring compliance with the European Convention on Human Rights.
Gray zone	Area weakly covered by mobile networks, where exposure is reduced without being zero.
HHS	Department of Health and Human Services: U.S. federal health department, to which this contribution is addressed.
Internet of Things, connected devices	Set of devices and sensors connected to one another and to the network, most often by radio link.
Judicial court (<i>tribunal judiciaire</i>)	French civil court of first instance.
Microenvironment	Typical place of everyday life — street, station, transport, office — where exposure is measured.
National Forests Office (<i>Office national des forêts</i>)	French public body responsible for managing public forests.
National Radio Quiet Zone	Radio quiet zone of approximately 13,000 square miles established in 1958 in the United States, between Green Bank and Sugar Grove, West Virginia, to protect radio astronomy observations and U.S. Navy radio receiving facilities.

Term	Meaning
New Deal mobile	Agreement concluded in January 2018 between the French State and the mobile operators: renewal of frequencies without auction, in exchange for territorial coverage commitments.
OneName Project	Initiative launched in 2024 in the United States to unify the naming of disorders attributed to electromagnetic fields; its decision-making committee chose the name <i>Electromagnetic Radiation Syndrome</i> (EMR Syndrome) in December 2024.
ONIR (ORNI in French)	Swiss Ordinance on Protection against Non-Ionising Radiation: it sets immission limit values, applicable everywhere, and, in places of sensitive use, installation limit values about ten times lower, as a precaution.
Places of sensitive use	Under Swiss law, premises where human beings regularly stay for prolonged periods — homes, schools, hospitals, permanent workplaces — and playgrounds, where the installation limit values apply.
Protective bed canopy	Canopy over a bed, made of conductive fabric, intended to reduce exposure to electromagnetic fields during sleep.
Regional nature park (<i>parc naturel régional</i>)	French rural territory classified for the value of its natural and cultural heritage, and managed according to a charter.
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Robin des Toits	French association committed to combating exposure to electromagnetic waves.
Small cell	Low-power, short-range antenna installed close to the ground, on street furniture or building facades; “small-area wireless access point” in European Union law.
Smart meter	Electricity, gas, or water meter that transmits its readings remotely, by radio link or by power line communication.
State forest (<i>forêt domaniale</i>)	Forest owned by the State, managed in France by the National Forests Office.
Targeted coverage scheme (<i>dispositif de couverture ciblée</i>)	Component of the New Deal mobile through which the State designates, by order, areas to be covered that the operators must serve within a set time frame.
V/m	Volt per meter: unit of measurement of the electric field.
“Wave refugees” (<i>réfugiés des ondes</i>)	Electro-hypersensitive individuals forced to change their place of living to find a refuge, as the networks expand (see Section 5.1).
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Section 4.1).
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 2 — Europe and Exposure Standards: A Framework Inherited from ICNIRP, Eroding Exceptions, and the Scientific Critique of Exposure Limits

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 5 (5n, 5o, 5p); 6; 12.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

Question 5 of the Request for Information asks which national and international standards and regulatory frameworks federal health agencies should take into account. This document describes the European framework and the criticism to which its limits are subject.

Nearly all European countries apply the guidelines of ICNIRP, a private-law association; these guidelines take only thermal effects into account, and the Council of the European Union took them up in a 1999 recommendation. Among the exceptions, Switzerland, Luxembourg, the Brussels-Capital Region, Wallonia until 2022, and Poland until 2019 show that a mobile network can operate under much lower limits; several of them have nevertheless backtracked under the pressure of deployment, and the industry is now calling for harmonization on ICNIRP. A table brings together the precautionary values proposed in Europe since 2000, from 0.6 to 0.02 V/m.

At the same time, work published in peer-reviewed journals challenges the founding assumptions of these limits, their safety factor, and the bibliographic basis of the 2020 guidelines; two studies based in particular on the animal data of the National Toxicology Program (NTP) arrive at protective limits from eight to more than nine hundred times lower, depending on the effect considered and the duration of exposure.

This document also presents the opposing positions, then sets out four recommendations.

1. Purpose

The Request for Information asks which national and international standards, guidelines, or regulatory frameworks should be taken into account (Question 5), what changes would improve the assessment, communication, and regulation of exposure (5n), what research is needed (5o), and how a classification system should account for characteristics such as modulation, pulsing, duty cycle, beamforming, simultaneous exposure to multiple frequencies, and cumulative exposure (5p). It also asks what data exist on adverse effects at current limits (Question 6) and below these limits (Question 12).

We answer mainly on the basis of European experience. The biological effects observed in human beings, in animals, and in the environment are developed in Documents 4, 6, and 8; exposure measurement, in Document 3.

2. Methods and Sources

The sources are of three kinds: normative texts and court decisions—the European recommendation, the Swiss ordinance, the Polish regulation, decisions of the Conseil d’État (France’s highest administrative court) and of the Nice Administrative Court—consulted in their own text; peer-reviewed publications; and institutional, advocacy, and industry reports, whose position is stated. The [NTP \(2018\)](#) and [Ramazzini Institute \(2018\)](#) studies and the reviews commissioned by the World Health Organization (WHO) are cited from the publications that analyze them; the review by [Karipidis et al. \(2024\)](#), from its abstract and its critique; the [SCENIHR \(2015\)](#) opinion, from the summary published by the European Commission; the Japanese and Korean validation studies (2026), from the excerpts recorded in our files and from their abstracts.

The two quoted passages from the 2018 report of Anses (French Agency for Food, Environmental and Occupational Health & Safety) were checked against its text. The building biology standard was read in its 2008 version, in English translation, the only version consulted.

Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document. Paragraph 8.2.1 of Council of Europe Resolution 1815 and the 2019 Swiss report were checked against their text on October 19, 2026. The Luxembourg operating conditions of 2002 and the Luxembourg government’s 2020 press release, the Walloon decree of 2009, the 2024 judgment of the Belgian Constitutional Court and the article of the Union of Cities and Municipalities of Wallonia on the 2022 decree, the two documents of the Government of Liechtenstein, and the 2004 presentation by a Salzburg State public health physician were consulted online on October 20, 2026, in excerpts. The author of this presentation, Gerd Oberfeld, is also one of the authors of the EUROPAEM guideline.

3. The European Framework of Exposure Limits (Question 5)

3.1 The ICNIRP Guidelines

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) is a private-law association based in Munich. Its 1998 guidelines, renewed in 2020 for whole-body exposure, rest on a single mechanism: tissue heating. Their starting point is a threshold of 4 W/kg of specific absorption rate (SAR), derived from behavioral experiments conducted in the 1980s on five monkeys and eight rats exposed for 40 to 60 minutes, divided by 10 for workers (0.4 W/kg) and by 50 for the public (0.08 W/kg) (ICBE-EMF, 2022). The same values underpin the limits of the Federal Communications Commission (FCC) adopted in 1996.

3.2 Their Adoption in Europe

Recommendation 1999/519/EC of the Council of the European Union took up these values and proposed them to the Member States (Council of the European Union, 1999). The opinions of the European Commission's scientific committee (SCENIHR, now SCHEER) then serve as a common reference for national health agencies; the opinion adopted on January 27, 2015, concludes that there is no scientific evidence of a link between the symptoms reported by those who describe themselves as electro-hypersensitive and exposure to electromagnetic fields (SCENIHR, 2015).

The convergence of national positions is therefore due not to one agency steering another, but to a common reference placed upstream of all of them.

3.3 France: Frozen Limits and Powerless Municipalities

In France, Decree No. 2002-775 of May 3, 2002, takes up the values of the European recommendation; the public exposure limit depends on frequency and reaches 61 V/m (French Republic, 2002). The law of February 9, 2015, introduced measures of sobriety and information, including a ban on Wi-Fi in facilities that receive children under three years of age (French Republic, 2015). The 6 V/m threshold that identified an “atypical point” was raised to 9 V/m on January 1, 2026 (see Document 1).

Asked to lower the limits, the Conseil d'État rejected the request on March 7, 2018 (No. 399727). It nevertheless noted that Anses had recommended, in an opinion of June 2016, reconsidering “the reference levels intended to limit environmental exposure to radiofrequency electromagnetic fields [...] in order to ensure sufficiently large safety margins to protect the health and safety of the general population, and most particularly those of children.” The rejection was pronounced “in view of the state of scientific knowledge and pending the results of the work undertaken” (Conseil d'État, 2018).

Mayors, for their part, cannot oppose an antenna on health grounds. On December 18, 2025, the interim relief judge of the Nice Administrative Court suspended a mayor's opposition to a base station antenna planned less than one hundred meters (about 330 feet) from a daycare center, on the grounds that the mayor does not hold the special police power regarding protection against waves (Nice Administrative Court, 2025).

3.4 Eroding Exceptions

Switzerland. The Ordinance on Protection against Non-Ionising Radiation (ONIR) distinguishes immission limit values, identical to those of ICNIRP, from installation limit values, applicable in places of sensitive use (homes, schools, kindergartens, hospitals, permanent workplaces): 4 V/m for installations transmitting around 900 MHz, 6 V/m from 1,800 MHz upward, and 5 V/m for mixed installations, that is, about ten times lower ([Swiss Federal Council, 1999](#)). In 2018, the Swiss Council of States rejected raising them by a single vote; the federal working group “Mobile Communications and Radiation,” in its report of November 18, 2019, presented five options without being able to agree on any one of them ([DETEC, 2019](#)). These values remain in force. The Swiss mobile network has therefore been operating for more than twenty years with limits about ten times lower in the places where individuals spend time.

Luxembourg. Since September 23, 2002, the operating conditions set by the Labor and Mines Inspectorate (ITM) have limited the field of mobile telephony antennas to 3 V/m per radiating element, in any place where human beings may stay ([ITM, 2002](#)). In 2020, the government announced that this threshold would be maintained for 5G ([Luxembourg Government, 2020](#)). The limit applies to each radiating element, not to total exposure.

The Brussels-Capital Region. The ordinance of March 1, 2007, set, at the reference frequency of 900 MHz, a limit of 3 V/m, which entered into force on March 14, 2009; this limit was raised to 6 V/m in 2014 for the deployment of 4G, then to 14.57 V/m outdoors and 9.19 V/m indoors in 2023 for the deployment of 5G ([Brussels Environment, 2026](#)).

Wallonia. The decree of April 3, 2009, limited to 3 V/m the field produced by each antenna in places where human beings stay ([Walloon Region, 2009](#)). The decree of December 8, 2022, adopted for the deployment of 5G, replaced this limit with a standard of 9.2 V/m per operator, at the reference frequency of 900 MHz, and 18.4 V/m per site; it does, however, prohibit mobile network antennas transmitting between 20 and 300 GHz ([Ransy, 2023](#)). In a case brought by two associations, the Constitutional Court dismissed the appeal on October 24, 2024, finding the reform reasonably justified by the deployment of 5G ([Belgian Constitutional Court, 2024](#)).

Poland. Its limits, among the strictest in Europe, were aligned with ICNIRP by a regulation of the Minister of Health of December 17, 2019, which entered into force on January 1, 2020, and which raises the permitted power density between 2 and 300 GHz from 0.1 to 10 W/m² ([Polish Minister of Health, 2019](#); [GSMA, 2026](#)).

Other rollbacks. Lithuania, whose limits inherited from the Soviet period represented about 1% of those of ICNIRP, raised them to 10% in 2015, then aligned them with ICNIRP in 2020 ([GSMA, 2026](#)). On April 29, 2024, Italy raised the value applicable to mobile telephone networks from 6 to 15 V/m ([Testa, 2024](#)). In Liechtenstein, the Environmental Protection Act of May 29, 2008, required the field of mobile telephony antennas to be reduced to 0.6 V/m from 2013; an initiative by business associations, which called for a return to the Swiss value, was put to a vote on December 4 and 6, 2009 ([Government of Liechtenstein, 2009](#)); in 2021, the law set installation limit values of 4 to 6 V/m, as in Switzerland ([Government of Liechtenstein, 2021](#)).

The industry’s call. In October 2026, the GSMA, the global association of mobile network operators, calls on countries to adopt the 2020 ICNIRP limits. It considers that stricter limits apply “arbitrary factors without scientific basis” to the ICNIRP values and that they can be understood as “a political response to societal risk perception”; it also quotes ICNIRP: “There is no evidence that additional precautionary measures will result in a benefit to the health of the population” (GSMA, 2026).

3.5 Precautionary Values Recommended in Europe

Since 2000, European bodies—a scientific conference, a regional administration, a parliamentary assembly, physicians, measurement practitioners—have proposed precautionary values far below the regulatory limits. The table brings them together; power densities are converted into electric field strength using the relation $S = E^2/377$.

Source	Nature of the source	Proposed value	Scope
Salzburg Resolution (2000)	International conference on the siting of base stations	0.6 V/m (1,000 $\mu\text{W}/\text{m}^2$)	Sum of emissions from GSM base stations (Salzburg Resolution, 2000; Oberfeld, 2004)
State of Salzburg (2002)	Public health department of the government of an Austrian state (<i>Land</i>)	0.06 V/m (10 $\mu\text{W}/\text{m}^2$) outdoors; 0.02 V/m (1 $\mu\text{W}/\text{m}^2$) indoors	Sum of GSM emissions, worst case (Oberfeld, 2004)
Council of Europe, Resolution 1815 (2011)	Parliamentary Assembly of an organization of 46 states	0.6 V/m (1,000 $\mu\text{W}/\text{m}^2$), then 0.2 V/m (100 $\mu\text{W}/\text{m}^2$) in the medium term	Indoors, long-term exposure (Council of Europe, 2011, § 8.2.1)
BioInitiative (2012)	International group of researchers	3 to 6 $\mu\text{W}/\text{m}^2$ (0.03 to 0.05 V/m)	Chronic exposure of sensitive populations and children (BioInitiative, 2012)
EUROPAEM (2016), mobile telephony and DECT	Association of physicians	Peak: 100 $\mu\text{W}/\text{m}^2$ (0.19 V/m) during the day; 10 $\mu\text{W}/\text{m}^2$ (0.06 V/m) at night; 1 $\mu\text{W}/\text{m}^2$ (0.02 V/m) for sensitive populations	Places occupied more than twenty hours per week (Belyaev et al., 2016)
EUROPAEM (2016), Wi-Fi	Same	Peak: 10 $\mu\text{W}/\text{m}^2$ (0.06 V/m) during the day; 1 $\mu\text{W}/\text{m}^2$ (0.02 V/m) at night; 0.1 $\mu\text{W}/\text{m}^2$ (0.006 V/m) for sensitive populations	Same
Building biology, SBM-2008 standard	Private German standard (Baubiologie Maes and IBN)	Peak: no concern below 0.1 $\mu\text{W}/\text{m}^2$ (0.006 V/m); slight concern up to 10 $\mu\text{W}/\text{m}^2$ (0.06 V/m); severe concern up to 1,000 $\mu\text{W}/\text{m}^2$ (0.6 V/m); extreme concern above	Sleeping areas, each source taken individually; values based on experience and the precautionary principle (IBN, 2008)
For comparison: ICNIRP (2020)	Private-law association	10 W/m ² , that is, 10,000,000 $\mu\text{W}/\text{m}^2$ (61 V/m), averaged over thirty minutes	Public, above 2 GHz

The EUROPAEM and building biology values are peak values, those of the State of Salzburg worst-case values, and those of ICNIRP averages. From 61 V/m to 0.02 V/m, the electric field is divided by three thousand, and the power density by ten million. Compliance with these values would still have to be verifiable: the power actually emitted by antennas is not measured continuously by any body independent of the operators (see Document 3, Section 4.7). Document 7 (Section 5.3) places these values among those currently in force.

4. The Scientific Critique of the Limits (Questions 6, 12)

4.1 The Founding Assumptions

The International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF) lists fourteen assumptions on which the FCC and ICNIRP limits rest, and argues that research over the past twenty-five years invalidates them (ICBE-EMF, 2022). The first is the existence of a 4 W/kg threshold below which no adverse effect occurs. According to the authors, it is contradicted by two studies: the NTP (2018) study, which found in rats an increase in cardiac schwannomas characterized as “clear evidence of carcinogenic activity”; and the Ramazzini Institute (2018) study, which observed the same type of tumor at a whole-body SAR of 0.1 W/kg—forty times below this threshold, and at a level close to the limit applicable to the public (0.08 W/kg). Among the other contested assumptions are the relevance of time-averaged SAR alone, without consideration of modulation or pulsing (Assumption 5, Question 5p), the absence of differences in absorption between adults and children (Assumption 7), and the absence of differences in individual sensitivity (Assumption 8).

4.2 The Safety Factor

According to ICBE-EMF (2022), applying the methods of the U.S. Environmental Protection Agency (EPA) for toxic substances—uncertainty factors for extrapolation from animals to human beings, human variability, the short duration of studies, and the inadequacy of data—would lead to a factor of 900 to 10,000, instead of 50.

Two studies applied the benchmark dose method to the NTP animal data and, in the case of the second, also to those of the Ramazzini Institute. Uche and Naidenko (2021), of the Environmental Working Group, a nongovernmental environmental health organization, arrive at a whole-body limit of 2 to 4 mW/kg, “an exposure level that is 20–40-fold lower than the legally permissible level of 0.08 W/kg”; adding a factor of 10 for children, they arrive at 0.2 to 0.4 mW/kg, that is, 200 to 400 times lower. Melnick and Moskowitz (2026) conclude that the FCC and ICNIRP limits for the public are 15 to more than 900 times higher, depending on the duration of daily exposure, than the exposure level corresponding to a cancer risk of 1 in 100,000, and 8 to 24 times higher than the level that protects male fertility. Ronald Melnick, a retired toxicologist from the National Institute of Environmental Health Sciences, led the design of the NTP studies on radiofrequency radiation. These authors rely on the systematic reviews commissioned by WHO, which conclude with a high level of certainty that cancer risk increases in exposed animals (Mevissen et al., 2025, cited in Melnick and Moskowitz, 2026).

4.3 The Bibliographic Basis of the 2020 Guidelines

Nordhagen and Flydal (2023) analyzed the references on which ICNIRP bases its thermal paradigm: 91 of the 106 relevant references come from the ICNIRP network; seventeen authors, ten of them affiliated with ICNIRP, cover this entire base; the eleven independent articles, all of which report non-thermal effects, are set aside. Hardell et al. (2021) note that none of the five reviews presented as the basis for the 2020 guidelines—those of WHO in 2014, of SCENIHR in 2015, and of the Swedish Radiation Safety Authority in 2015, 2016, and 2018—was published in a peer-reviewed journal, and that current or former members of ICNIRP were among their authors: four of the six experts in the WHO core group, four of the ten external experts of SCENIHR, and about half of the Swedish scientific council. A report commissioned in 2020 by two Members of the European Parliament, Michèle Rivasi and Klaus Buchner, and funded by the Greens/European Free Alliance group, documents the self-perpetuating, co-optation-based membership of ICNIRP and the links of some of its members with industry (Van Scharen et al., 2020).

4.4 Opposing Positions

ICNIRP and the GSMA maintain that current limits protect the entire population against established effects, and that additional precautionary measures would bring no demonstrated benefit (GSMA, 2026).

A systematic review commissioned by WHO concludes, with moderate certainty, that exposure of the head from mobile phone use probably does not increase the risk of glioma, meningioma, acoustic neuroma, or pituitary and salivary gland tumors in adults, or of brain tumors in children (Karipidis et al., 2024). A critique published in the same journal identifies five methodological weaknesses in this review, including the inclusion of studies of deficient design and overly coarse exposure categories, and points out that some of its authors were members of ICNIRP or linked to the telecommunications industry (Frank et al., 2025); the first author of the review, Ken Karipidis, sits on the main commission of ICNIRP.

Two validation studies of the NTP study, conducted in Japan and Korea on 70 rats per group at a single dose of 4 W/kg, find no statistically significant increase in tumors (Imaida et al., 2026; Kim et al., 2026). Three members of ICBE-EMF counter that their statistical power was insufficient—258 rats per group would have been needed for a power of 80%—and that the choice of a single dose ran counter to the requirements of the Food and Drug Administration and the OECD for carcinogenicity studies (Melnick et al., 2026).

In France, the 2018 Anses report on electro-hypersensitivity concludes that “no solid experimental evidence currently makes it possible to establish a causal link,” while acknowledging that the pain and suffering expressed by those most directly affected “correspond to a lived reality” (Anses, 2018). On April 29, 2025, a court of appeal relied on this report to overturn a judgment that had recognized the right of an electro-hypersensitive individual to remain in a white zone (see Document 1).

5. Discussion

The European framework and the U.S. framework share the same origin: a thermal threshold established in the 1980s and a safety factor of 50. The European exceptions offer two lessons. On the one hand, Switzerland shows that a mobile network can operate durably with limits about ten times lower in the places where individuals spend time, and Luxembourg has maintained its limit of 3 V/m per radiating element for 5G. On the other hand, the evolution of Brussels, Wallonia, Poland, Lithuania, Italy, and Liechtenstein shows that these exceptions give way as deployment intensifies: the limits then follow the needs of the networks, and not the state of health knowledge. In 2018, the Conseil d'État maintained the limits “pending the results of the work undertaken”; eight years later, the studies based on NTP data argue for markedly lower limits: twenty to forty times lower for [Uche and Naidenko \(2021\)](#), with regard to the cardiomyopathy observed in rats, and fifteen to more than nine hundred times lower with regard to cancer risk for [Melnick and Moskowitz \(2026\)](#).

6. Limitations

Several pieces of data are reported from secondary sources: the NTP and Ramazzini Institute studies from ICBE-EMF, the review by Karipidis et al. from its abstract and its critique, the SCENIHR opinion from the European Commission's summary, and the cases of Lithuania and Italy from the GSMA report and the press, checked where possible; that of Liechtenstein from its government's documents, without the numerical result of the 2009 vote. The authors of ICBE-EMF and of several of the critical works are engaged in the public debate on waves, as are ICNIRP and the GSMA on the opposite side; the position of each is stated.

7. Recommendations (Questions 5n, 5o, 5p)

1. Base exposure limits on the available toxicological data, using the benchmark dose method, with the uncertainty factors applied to other toxic agents, including for children, as [Uche and Naidenko \(2021\)](#) and [Melnick and Moskowitz \(2026\)](#) have done.
 2. Establish, in places of prolonged stay—homes, schools, daycare centers, hospitals—precautionary values modeled on the Swiss ordinance and on paragraph 8.2.1 of Council of Europe Resolution 1815, and reduce exposure at the source accordingly throughout the territory.
 3. Adopt a classification system that takes into account modulation, pulsing, duty cycle, beamforming, and cumulative exposure to multiple sources, and not time-averaged SAR alone.
 4. Entrust expert assessment to scientists with no ties to ICNIRP or to industry, under public and verifiable rules for declaring conflicts of interest.
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Glossary

Term	Meaning
4G, 5G	Fourth and fifth generations of mobile telephone networks.
Administrative court (<i>tribunal administratif</i>)	French first-instance administrative court.
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
Atypical point	In France, a location where the exposure level exceeds the threshold set by the French National Frequency Agency (ANFR)—6 V/m until 2025, 9 V/m since January 1, 2026—and requires action by the operators.
Benchmark dose	Risk assessment method that determines, from experimental data, the dose associated with a given increase in the frequency of an effect, before uncertainty factors are applied.
BioInitiative	Report written by an international group of researchers, published in 2007 and updated in 2012, which reviews the biological effects of electromagnetic fields and proposes precautionary values.
Building biology (<i>Baubiologie</i>)	Discipline born in Germany, devoted to the effects of housing on health; its guideline values are published by the Baubiologie Maes office and the Institut für Baubiologie + Ökologie (now Institut für Baubiologie + Nachhaltigkeit), which are private bodies.
Conseil d'État	France's highest administrative court; among other things, it rules in last resort on appeals against the interim relief orders of administrative courts.
Constitutional Court (Belgium)	Belgian court that reviews the conformity of laws, decrees, and ordinances with the Constitution.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
Environmental Working Group	U.S. nongovernmental environmental health organization.
EPA	Environmental Protection Agency: U.S. federal agency for environmental protection.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
FCC	Federal Communications Commission: U.S. federal agency that regulates telecommunications and sets the limits for exposure to radiofrequency radiation.

Term	Meaning
FDA	Food and Drug Administration: U.S. federal agency responsible, among other things, for radiation-emitting products.
Glioma, meningioma, acoustic neuroma	Tumors, respectively, of the glial cells of the brain, of the meninges, and of the sheath of the auditory nerve.
Greens/European Free Alliance	Political group of the European Parliament bringing together green and regionalist parties.
GSMA	Global association of mobile network operators.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
IBN	Institut für Baubiologie + Ökologie, now Institut für Baubiologie + Nachhaltigkeit: private German building biology institute, on whose behalf the Baubiologie Maes office established the discipline's testing standard and guideline values.
ICBE-EMF	International Commission on the Biological Effects of Electromagnetic Fields: international group of scientists that challenges the foundations of the FCC and ICNIRP exposure limits.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
ITM	Inspection du travail et des mines (Labor and Mines Inspectorate): Luxembourg administration that sets, among other things, the operating conditions of radiofrequency transmitters.
Land	Federal state of Austria or Germany, with its own government.
NTP, NIEHS	National Institute of Environmental Health Sciences, an institute of the U.S. National Institutes of Health; it houses the National Toxicology Program, which conducted the animal studies on radiofrequency radiation published in 2018.
OECD	Organisation for Economic Co-operation and Development, which publishes, among other things, guidelines for toxicity testing.
ONIR	Swiss Ordinance on Protection against Non-Ionising Radiation (ORNI in French): it sets immission limit values, identical to those of ICNIRP, and, in places of sensitive use, installation limit values about ten times lower, as a precaution.
Peak value	Maximum value of a signal over the duration of the measurement, as opposed to its average value.
Places of sensitive use	Under Swiss law, premises where human beings regularly stay for prolonged periods – homes, schools, hospitals, permanent workplaces – and playgrounds, where the installation limit values apply.
Radiating element	Part of an antenna that transmits the signal; a single installation may have several.
Ramazzini Institute	Italian cancer research institute, in Bologna, which published in 2018 a carcinogenicity study on rats exposed to radiofrequency radiation throughout their lives.

Term	Meaning
Recommendation 1999/519/EC	Recommendation of the Council of the European Union of July 12, 1999, which proposes to the Member States limits on public exposure taken from the 1998 ICNIRP guidelines.
Référé (interim relief)	Emergency procedure by which a judge orders provisional measures.
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Safety factor, uncertainty factor	Divisor applied to an effect threshold to set an exposure limit, in order to account for uncertainties: extrapolation from animals to human beings, individual variability, duration of studies.
Salzburg Resolution	Resolution adopted in June 2000 at an international conference held in Salzburg on the siting of mobile telephony base stations, which proposed a precautionary value of 1,000 $\mu\text{W}/\text{m}^2$.
SAR (specific absorption rate)	Power absorbed per unit mass of tissue, in watts per kilogram; it is used to verify the compliance of devices worn close to the body.
SCENIHR, SCHEER	Scientific Committee on Emerging and Newly Identified Health Risks of the European Commission, which became the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER).
Schwannoma	Tumor of the Schwann cells, which surround nerve fibers; cardiac schwannomas were observed in rats in the NTP and Ramazzini Institute studies.
Statistical power	Probability that a study will detect a real effect of a given size; it depends in particular on the number of animals or subjects per group.
Systematic review	Synthesis of the literature according to an explicit and reproducible method for searching, selecting, and assessing studies.
UVCW	Union des villes et communes de Wallonie (Union of Cities and Municipalities of Wallonia): association of Walloon local authorities.
V/m, $\mu\text{W}/\text{m}^2$, W/m^2	Units of field intensity: the volt per meter measures the electric field, the microwatt and the watt per square meter measure power density; $S = E^2/377$ converts one into the other.
WHO	World Health Organization.
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 3 — Measuring Waves: What Is Measured, What Is Not Measured, and What Should Be Made Public

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 7; 8; 9.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

This document describes the methods used in Europe, mainly in France and Belgium, to measure exposure to radiofrequency (RF) radiation, their blind spots, and the information made public. French regulatory measurement is carried out by accredited laboratories, on request, with the recommendation that equipment with non-permanent emissions, including phones, be switched off; it is extrapolated to maximum emission conditions only above 6 V/m or on request. The national modeling published in 2025 covers outdoor exposure only. Both tools exclude the source that often dominates the dose received by the head: the user's own phone, whose transmit power increases where the network is weak. Nor do they capture the concentration of energy produced by beamforming antennas, under which a recent simulation shows that compliance with the reference level no longer guarantees compliance with the basic restriction. To our knowledge, the measuring devices most commonly used do not go down to the precautionary values recommended in Europe, and low frequencies, including the power line communication signal of smart meters, remain outside the protocols. Finally, no body independent of the operators continuously measures what each antenna actually emits. France already publishes a substantial share of the information—information files sent to mayors, the map of antennas, measurement results, the specific absorption rate of phones—but this information confers no power to act and does not indicate the low-exposure places that the electro-hypersensitive need. The document sets out seven recommendations.

1. Purpose

The Request for Information asks what scientific methods are currently available to characterize individual and population-level exposure to RF radiation (Question 7), what improvements in exposure assessment methodologies would be needed to account for real-world exposure conditions (Question 8), and what technical and exposure-related information should be disclosed to consumers, residents, workers, schools, health care providers, and local governments (Question 9).

We answer on the basis of the European systems we know and of our own measurement practice. The exposure limits themselves are addressed in Document 2; information intended for physicians, in Document 8 (Section 7) and in Document 9.

2. Methods and Sources

Our sources are of five kinds: French legislative and regulatory texts, consulted in their own text; the protocol, reports, and press releases of the French National Frequency Agency (ANFR); court decisions, known from our files; peer-reviewed publications, read in full unless otherwise stated; and documents from associations, businesses, and industry, whose position is stated. The microenvironmental measurement studies of [Urbiniello et al. \(2014\)](#) and [Beláčková et al. \(2025\)](#) are cited from the analyses in our files; the New York study by [Thielens et al. \(2026\)](#), from its abstract and the Environmental Health News report. The 2023 ANFR press release on a phone model, the 2025 release on the national simulation, and the law of February 9, 2015, were checked against their text on October 19, 2026; the quoted passages from the ANFR measurement protocol, from its two June 2025 reports, and from the GSMA report, on October 20, 2026. The 2020 and 2021 ANFR press releases on its sensors, its 2020 article on spectrum monitoring, the page of the Swiss Federal Office for the Environment on adaptive antennas, and the Brussels Environment page on the enforcement of standards were consulted online on October 20, 2026, in excerpts. The action sheet from Bagnères-de-Bigorre was read in full; the commercial offer of an EMF assessor and the Belgian data are reported from our files. Quotations in English are reproduced as written. Quotations from French sources are our translations; the original wording appears in the French version of this document.

3. Existing Methods (Question 7)

3.1 Two Tiers of Limits, Two Quantities

The ICNIRP guidelines distinguish basic restrictions, which apply to the energy absorbed in the body—the specific absorption rate (SAR), in W/kg, and above 6 GHz the absorbed power density—from reference levels, which apply to the field measurable outside the body, in V/m or W/m², and are meant to guarantee compliance with the former. The French exposure limits, from 36 to 61 V/m depending on frequency for the mobile telephony bands, are reference levels, set by Decree

No. 2002-775 of May 3, 2002 ([French Republic, 2002](#)). In situ measurement concerns the field strength; SAR is measured only in the laboratory, on devices.

3.2 Regulatory Measurement in France

The ANFR protocol is applied by laboratories accredited by the French Accreditation Committee (COFRAC) in accordance with standard NF EN ISO/IEC 17025. It comprises a broadband measurement, which gives an overall value (case A), and, where necessary, a detailed frequency-selective measurement with a spectrum analyzer (case B); the value retained is a root-mean-square average over six minutes. When the broadband measurement exceeds 6 V/m, or on specific request, the detailed measurement is extrapolated to the maximum emission conditions of the antennas; the broadband measurement is never extrapolated ([ANFR, 2019](#)). Measurements are free of charge for the requester, and their results are published on the Cartoradio website.

Aggregate results show an increase: the mean overall exposure level rose from 0.72 V/m over the 2014–2019 period to 1.2 V/m in 2024, and the share of measurements exceeding 6 V/m from 0.6% in 2014 to 3.8% in 2024 ([ANFR, 2025a](#)). ANFR identified 74 “atypical points” in 2024; the share of points resolved, which had reached 79% for those detected in 2019 and 64% for those of 2018, stands at 22% for those of 2024, a provisional figure as of December 31, 2024, when 48 of the 74 cases were still under review ([ANFR, 2025c](#)). The threshold defining these points was raised from 6 to 9 V/m on January 1, 2026 (see Documents 1 and 2). These measurements are made at the request of private individuals or local authorities: they do not constitute a representative sample. Over eleven years, 123 measurements were made in Strasbourg and 159 in Montpellier ([ANFR, 2025a](#)).

Two recent decisions held that a non-accredited measurement was not sufficient to establish a regulatory exceedance, making accreditation the condition of proof ([Montpellier Court of Appeal, 2024](#); [Grenoble Administrative Court, 2026](#)).

3.3 Modeling

Since April 2025, ANFR has published a simulation of exposure across the entire territory of metropolitan France: it concerns the exposure “created outside buildings by mobile telephony stations,” calculated at 1.5 m above the ground, on the basis of authorized stations and a three-dimensional model of the terrain and buildings. The Agency itself specifies that “only measurements taken in the field make it possible to establish the actual level of exposure precisely” ([ANFR, 2025b](#)).

In Belgium, competence is shared between the federal State and the Regions, which are responsible for enforcing exposure standards. According to Inter-Environnement Bruxelles, the Belgian Institute for Postal Services and Telecommunications (BIPT) no longer carries out field measurements and proceeds by modeling based on data supplied by the operators; the Brussels-Capital Region supplements its simulations with an annual vehicle-based measurement campaign along a fixed route; in Wallonia, metrology is the responsibility of the Scientific Institute of Public Service (ISSEP), and antenna sites appear on a public map layer (from our files).

3.4 Research Campaigns

Three families of methods are used. Microenvironmental measurements, using exposimeters carried along fixed routes, have been conducted in Switzerland, Belgium, the Netherlands, and Spain by a single network of researchers: the network's first trend study reported a 38.2% increase in outdoor exposure in one year in Brussels ([Urbinello et al., 2014](#)); the most recent finds no significant change in downlink exposure between 2016 and 2023 ([Beláčková et al., 2025](#)). One of the main authors of this series was a member of the ICNIRP Commission from 2016 to 2024 ([ICNIRP, 2026](#)) and sat on the board of a research foundation funded by the mobile telephony industry. In New York, measurements conducted in 2024–2025 in the five boroughs across 39 frequency bands give a mean exposure of 0.97 V/m ([Thielens et al., 2026](#)). According to the Environmental Health News report, this level is more than one hundred times higher than the level recorded by the Environmental Protection Agency (EPA) in 1976 ([EHN, 2026](#)); we were unable to verify this comparison against the full text, and it most likely concerns power density, which would correspond to a factor of about ten in electric field strength. The first author is among the members of the ICNIRP Scientific Expert Group ([ICNIRP, 2026](#)); he is also a coauthor of the study by [Beláčková et al. \(2025\)](#).

Vehicle-based measurements cover large areas: in South Korea, the mean field from 3G, 4G, and 5G antennas reaches 2.49 V/m in Seoul, 1.32 V/m in a second city, designated “GJ” by the authors, and 1.04 V/m in a rural area, with 5G adding about 23% to the field ([Lee et al., 2026](#)). Finally, computational dosimetry calculates the energy absorbed by organs from the measured fields, using anatomical models of children and adults ([Lee and Choi, 2023](#)).

3.5 Individual Exposure

The SAR of phones is measured in the laboratory by manufacturers, then checked by ANFR on devices sampled from stores: in contact with the body for “limb” SAR, and at 5 mm for “trunk” SAR. In September 2023, this check led to the suspension of sales of a widely sold phone model, whose “limb” SAR reached 5.74 W/kg “for a regulatory value of 4 W/kg” ([ANFR, 2023](#)). ANFR publishes the results of these checks as open data.

The power actually emitted by a phone can be recorded with diagnostic software, which makes it possible to estimate the dose received by the user according to place and use ([Liu et al., 2026](#)).

Private individuals have access to consumer devices. We ourselves use a broadband detector, which sums the energy received between 50 MHz and 10 GHz into a single value and does not make it possible to identify the sources; without a calibration certificate, it serves to compare places, not to establish a level. In our experience, an electro-hypersensitive individual should have at least a basic measuring device, one that makes it possible to locate the sources and to choose the places where one lives and sleeps; such a device costs about €250. Professional EMF assessors use more sensitive analyzers, but according to the commercial offer of one of them, most of that assessor's colleagues measure only from 15 $\mu\text{W}/\text{m}^2$, or about 0.075 V/m ([Habitats pour électrosensibles, 2026](#)).

4. What the Methods Do Not Capture (Question 8)

4.1 The User's Phone, Excluded from Measurement

The ANFR protocol recommends switching off, during the measurement, “equipment whose emissions are controlled and non-permanent,” which includes phones (ANFR, 2019). The national modeling does not take them into account either. Yet in French 4G networks, the phone's share of the dose received in one month by a typical user reaches, at 2,600 MHz, 30% for the head and 12.8% for the whole body when the field from the antennas is 1 V/m, and 75% and 50.4% when it is 0.38 V/m (Liu et al., 2026). The phone transmits more strongly where the network is less dense: in rural and periurban areas rather than in cities, indoors rather than outdoors. Users who move away from antennas therefore receive less from them and more from their own phones, which neither measurement nor simulation shows.

4.2 Antennas, the Dominant Share over Time

Depending on the network and on use, the share of the antennas may again become predominant over time. In Seoul, for 24 hours of exposure to antennas and 10 minutes of calls, the energy absorbed by the whole brain of a six-year-old child reaches about 300 mJ/kg from the antennas and 2 mJ/kg from the phone (Lee and Choi, 2023). For a child living in the countryside who watches two hours of video and makes ten minutes of calls per day, Lee et al. (2026) calculate 1.33 J/kg per day from the antennas and 0.079 J/kg from the phone. The authors of the French study emphasize that downlink exposure, weak at any given instant, produces through its continuity “significant cumulative effects at the population level” (Liu et al., 2026). Assessment must therefore cover both sources and the duration of exposure.

4.3 Beamforming

5G beamforming antennas concentrate their signal on the user. A simulation on four anatomical models shows that at 3,500 MHz, under simplified beamforming, a field set at the reference level leads to exceeding the local basic restriction of 2 W/kg for all four models, with values of 131% to 158% of that restriction; the authors conclude that the ICNIRP reference levels at 3,500 MHz and 7 GHz “do not guarantee compliance with basic restrictions when beamforming concentrates energy on the body,” while specifying that their beamforming scenario is not an upper bound and that the exposure measured in deployed 5G networks remains three to four orders of magnitude below this reference level (Wydaeghe et al., 2026). At the same time, the global association of mobile operators is asking countries to assess the compliance of base stations on the basis of their actual maximum emissions (“actual maximum approach”) rather than theoretical maximum parameters, which it considers “especially important to the accurate assessment of advanced antennas with beamforming capabilities” (GSMA, 2026). The first line of work shows that field measurement may underestimate local exposure; the second would reduce the assessed values.

4.4 Averages, Peaks, and Detection Thresholds

Regulatory measurement retains a six-minute average, extrapolated to maximum emission conditions above 6 V/m or on request. The guideline of the European Academy for Environmental Medicine (EUROPAEM), by contrast, calls for peak measurement, at the bed and at the workplace, and proposes for mobile telephony and DECT guidance values of 100 $\mu\text{W}/\text{m}^2$ during the day, 10 $\mu\text{W}/\text{m}^2$ at night, and 1 $\mu\text{W}/\text{m}^2$ for sensitive populations, i.e., 0.19, 0.06, and 0.019 V/m (Belyaev et al., 2016). A device that measures only from 0.075 V/m cannot verify compliance with the last two values. Measurement uncertainties appear in accredited reports but rarely in information intended for the public; the protocol aims at an expanded uncertainty of 4 dB and allows up to 6 dB, i.e., a factor of 2 in field strength and 4 in power (ANFR, 2019).

4.5 Low Frequencies and Power Line Communication

The national simulation and most campaigns cover only radiofrequency fields. Smart electricity meters superimpose on the 50 Hz household current a communication signal in the 35.9 to 90.6 kHz band (G3-PLC) or at 63.3 and 74 kHz (G1). We have identified no study of the biological effect of this composite signal as it exists in homes; the reference studies on sensitivity to low frequencies concerned, to our knowledge, a pure 50 Hz field, in the laboratory. For the 3 kHz to 3 MHz range, EUROPAEM proposes guidance values of 0.1 V/m during the day and 0.01 V/m at night for the electric field (Belyaev et al., 2016).

4.6 The Choice of Locations

A campaign that measures only one network, that measures at the foot of antennas, where the main beam passes above the measurement point, or that selects its sites, can produce low values without any of the data being false. The representativeness of a measurement depends on these choices, which must be declared.

4.7 What Antennas Actually Emit

Regulatory measurement concerns the field received at one point, at a given moment. What each antenna actually emits, hour by hour, is not measured continuously by any body independent of the operators. In France, from 2020 onward, ANFR installed autonomous sensors in a few large cities—Marseille, Nantes, Paris, Bordeaux, Mulhouse, Lille, and Orléans as of September 2021—which measure the ambient field from 80 MHz to 6 GHz about ten times a day, for six minutes, and publish the values (ANFR, 2020; ANFR, 2021). They provide information on exposure at a few points; they do not show what each antenna emits. ANFR site inspections record the coordinates and the characteristics of the tower, of the installations, and of their users, and compare them with the registered data (Spanjaard-Huber, 2020). For France, we found no public information on how the power actually emitted is compared with the authorized power, nor on the existence of automatic power limiters.

Other countries show that such control is possible, but it relies on the operators' own data. In Switzerland, the operators' quality assurance systems continuously compare the transmitted powers with the authorized values, and adaptive antennas that benefit from a correction factor

must be equipped with an automatic power-limiting device (FOEN, 2021). In Brussels, the environmental permit may require an automatic transmit-power limiting system; several times a year, Brussels Environment asks the operators for extracts from their network management systems in order to check the parameters of more than 15,000 transmitters; its forty sensors, which measure the field twelve times a day, are not precise enough to be compared directly with the standard (Brussels Environment, 2025).

5. What Should Be Made Public (Question 9)

5.1 What France Already Publishes

Law No. 2015-136 of February 9, 2015, provides for extensive information (French Republic, 2015). An operator planning an antenna sends the mayor an information file before applying for a planning permit—two months before, a period reduced to one month in 2018—accompanied, at the mayor's request, by a "simulation of the exposure to electromagnetic fields generated by the installation," and this information is made available to residents. According to the implementing regulations, the file lists the daycare centers, schools, and health care facilities located within one hundred meters (about 330 feet). "A national inventory of the atypical points of the territory is drawn up each year by the National Frequency Agency." ANFR makes a map of existing antennas available to municipalities. For radio equipment offered for sale, "the specific absorption rate is indicated in a legible, intelligible manner and in French"; the instructions explain how to activate and deactivate wireless internet access, where the device allows it, since the law does not require that deactivation be possible; and "establishments offering Wi-Fi access to the public indicate this clearly by means of a pictogram at the entrance to the establishment." Measurement results are published on Cartoradio, the national simulation can be consulted there, and SAR checks are published as open data.

5.2 What This Information Does Not Allow

Information carries no power. The mayor who receives the file cannot oppose the project on health grounds (see Document 2), and can only give residents the opportunity to submit comments, which have no binding effect. The inventory of atypical points comes with a falling resolution rate and a raised threshold. The national simulation represents only outdoor exposure, whereas most time is spent inside buildings, and at night in bed. The SAR displayed is that of standardized tests, and the non-compliance of one model was revealed only by an after-the-fact check.

Above all, nothing indicates low-exposure places. An electro-hypersensitive individual looking for a place to live or to stay must today reconstruct, unaided, from antenna maps, coverage maps, and personal readings, what the ANFR simulation already partly contains. Meanwhile, low-exposure areas are shrinking as coverage expands (see Document 1).

5.3 Local Initiatives

Some local authorities are considering carrying out measurements themselves. A slate of candidates running in the 2026 municipal elections in Bagnères-de-Bigorre proposes to train and

equip a municipal employee, to measure indoors and outdoors “giving priority to places that receive vulnerable individuals,” to map peaks, and to identify sources; for the equipment, it reports estimates from equipment suppliers ranging from €1,000 to more than €25,000 depending on the frequency range covered ([Bagnères citoyenne, 2025](#)).

6. Discussion

European systems measure well what they were designed to measure: compliance, at one point and at one moment, with a reference level based on heating. They do not measure the real exposure of an individual, which adds together the continuous field from antennas, often dominant over the day, and the emissions of the individual's own phone, dominant for the head during use, and stronger the weaker the network. They do not capture the local concentration of energy produced by steerable-beam antennas, nor low frequencies, and they do not continuously monitor what antennas emit. French measurements show rising exposure, but their sample is not representative; the studies that conclude that exposure is stable cover a short period, from 2016 to 2023; long-term comparisons, such as the New York one, conducted by a researcher from the same network, indicate a substantial increase. The information published in France is extensive, but it describes the infrastructure without giving any leverage over it and does not indicate low-exposure places.

7. Limitations

Our measurement practice relies on an uncalibrated consumer device and claims no probative value. Several of the studies cited rely on a limited number of anatomical models and on typical usage patterns; vehicle-based measurements are made outdoors. The data for Belgium come from regional and advocacy sources. The authors of several of the studies cited belong to networks linked to ICNIRP or to industry: in addition to those mentioned in Section 3.4, J. Wiart, a coauthor of four of them, is presented by [Lee et al. \(2026\)](#) as chair of the technical committee of the European Committee for Electrotechnical Standardization (CENELEC) responsible for exposure standards.

8. Recommendations (Questions 7, 8, 9)

1. Measure real exposure: protocols that include the emissions of personal devices and the field from antennas, inside homes, over at least 24 hours, as peak and average values, with a statement of uncertainty.
2. Assess the compliance of beamforming antennas against basic restrictions, and not against reference levels alone, and subject any method based on actual emissions to an independent assessment of its effects on local exposure.
3. Require the measuring instruments used to inform the public to have a detection threshold compatible with precautionary values, i.e., 0.02 V/m at most.

4. Bring low frequencies and power line communication within the scope of measurement, and fund the study of their combined effect.
5. Establish continuous monitoring by fixed stations, managed by a body with no ties to the operators, with publication of the raw data, and equip each antenna with an automatic power limiter whose operation is verified by that body.
6. Make public, in an accessible form: the map of existing and planned antennas, indoor and outdoor simulations, measurement results, the SAR measured in contact with the body, and a map of low-exposure areas, with a view to preserving those that remain and reconstituting others.
7. Recognize that each electro-hypersensitive individual should have a high-performance measuring device, one that makes it possible to measure quickly the environment in which one lives and to leave it if necessary, so as not to have to suffer its effects.

Glossary

Term	Meaning
3G, 4G, 5G	Third, fourth, and fifth generations of mobile telephony networks.
Absorbed power density	Power absorbed per unit area of skin; ICNIRP basic restriction above 6 GHz.
Adaptive antenna	Antenna whose transmission direction or radiation pattern changes automatically at short intervals, notably through beamforming.
ANFR	Agence nationale des fréquences (French National Frequency Agency): French public body responsible for managing radio frequencies and for monitoring public exposure, notably the SAR of phones sold in France.
Atypical point	Location where the measured exposure clearly exceeds usual levels; the threshold, 6 V/m until 2025, has been 9 V/m since January 1, 2026.
Automatic power limiter	Device that keeps the power transmitted by an antenna, averaged over a given period, below a set value.
Autonomous sensor	Fixed probe that measures the ambient field at regular intervals and transmits its readings remotely.
Base station	A mobile telephone installation comprising one or more antennas.
Beamforming	Technique by which an antenna concentrates its signal in the direction of the user instead of emitting it uniformly.
BIPT	Belgian Institute for Postal Services and Telecommunications (IBPT in French): Belgian federal telecommunications regulator.
Cartoradio	Public ANFR website that locates antennas and publishes the results of exposure measurements as well as the national simulation.
Case A, case B	In the ANFR protocol, overall broadband measurement (case A) and detailed measurement by frequency, source, or sub-band (case B).
CENELEC	European Committee for Electrotechnical Standardization.

Term	Meaning
COFRAC	Comité français d'accréditation (French Accreditation Committee): body that attests to the competence of measurement laboratories.
Computational dosimetry	Calculation, by simulation on an anatomical model, of the energy absorbed by tissues.
Correction factor	In Switzerland, coefficient applied to the authorized power of an adaptive antenna to account for the variability of its transmission directions.
Decibel (dB)	Logarithmic unit of ratio: 3 dB corresponds to a factor of 2 in power; 6 dB, to a factor of 4 in power and 2 in field strength.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
Downlink exposure, uplink exposure	Downlink exposure comes from base station antennas; uplink exposure, from the user's phone.
ECO mode	Mode of DECT cordless phones in which the base stops transmitting, or transmits only very weakly, when no call is in progress.
EHN	Environmental Health News: U.S. media outlet devoted to environmental health.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
EPA	Environmental Protection Agency: U.S. federal agency for environmental protection.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
Expanded uncertainty	Interval within which the true value of a measured quantity lies with high probability.
Exposimeter	Body-worn measuring device that continuously records the field received in several frequency bands.
FOEN	Swiss Federal Office for the Environment (OFEV in French): Swiss federal administration responsible, among other things, for applying the Ordinance on Protection against Non-Ionising Radiation.
G1, G3-PLC	Successive generations of the power line communication technology of French smart electricity meters: signals at 63.3 and 74 kHz (G1), 35.9 to 90.6 kHz band (G3-PLC).
GSMA	Global association of mobile network operators.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
HHS	Department of Health and Human Services: U.S. federal health department, to which this contribution is addressed.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.

Term	Meaning
ISSeP	Institut scientifique de service public (Scientific Institute of Public Service): Walloon public body for environmental metrology.
Microenvironment	Type of place (shopping street, public transportation, park, etc.) in which exposure is measured along a fixed route.
NF EN ISO/IEC 17025	International standard setting out the competence requirements for testing and calibration laboratories.
Peak value	Maximum value of a signal over the duration of the measurement, as opposed to its average value.
Power line communication (PLC)	Data transmission by superimposing a signal of a few tens of kilohertz on the electric current of existing wiring.
Quality assurance system	In Switzerland, the operators' system that continuously compares the power transmitted by each antenna with the authorized values, under the supervision of the authorities.
Reference level, basic restriction	The basic restriction limits the energy absorbed in the body; the reference level limits the field measurable outside the body and is supposed to guarantee compliance with the former.
Root mean square (RMS)	Effective value of a signal: the square root of the mean of its squared values.
SAR	Specific absorption rate: power absorbed per unit mass of tissue, in watts per kilogram; it is used to verify the compliance of devices worn close to the body.
Spectrum analyzer	Device that measures the field frequency by frequency and makes it possible to identify its sources.
V/m, $\mu\text{W}/\text{m}^2$	Units of field intensity: the volt per meter measures the electric field, the microwatt per square meter the power density; $S = E^2/377$ converts one into the other.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 4 — Recognition of Electro-Hypersensitivity and Sensitive Populations: A Syndrome Without a Code, Case-by-Case Recognition, Documented Vulnerabilities

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 10 (10a to 10e, 10g, 10h; Question 10f is addressed in Document 8); 11 (11a to 11g; Question 11g is developed in Document 1).

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

Electro-hypersensitivity does not appear in the International Classification of Diseases (ICD-11) of the World Health Organization (WHO). Without an entity or a code, no registry is possible; without a registry, prevalence is known only through self-report surveys, whose results range, according to Anses, from 0.7% to 13.3% depending on the country and the year, and vary with the place of the subject in the public sphere. In Europe, recognition is advancing by way of disability rather than by way of disease: in 2009, the European Parliament invited the Member States to follow the Swedish example, and French and German courts and administrations have recognized, case by case, the incapacity and the disadvantage suffered, without settling the scientific question of the cause; in occupational matters, at least two French courts have accepted a legal link between exposure at work and the condition. European labor law already recognizes workers at particular risk from electromagnetic fields—individuals with implanted medical devices, pregnant women—without covering long-term effects. Recent dosimetric studies show that the child absorbs more energy than the adult, to the point of possibly exceeding the basic restriction when the external field reaches the reference level. The document sets out seven recommendations, the first of which calls for reducing exposure at the source for the entire population.

1. Purpose

The Request for Information asks what data sources and surveillance systems exist to monitor the possible adverse effects of radiofrequency exposure, and whether others should be developed: disease registries (10a), occupational (10b) and environmental (10c) monitoring, longitudinal cohorts (10d), biomonitoring (10e), adverse event reporting (10f), case clusters (10g), and other sources (10h) (Question 10). It also asks whether exposure assessment or risk evaluation should differ for sensitive populations: children (11a), pregnant women (11b), older adults (11c), individuals with implanted medical devices (11d), highly exposed workers (11e), individuals with preexisting conditions (11f), and other populations that may experience particular effects (11g) (Question 11).

The recognition of electro-hypersensitivity governs the answer to both questions: only what is named can be monitored, and a sensitive population is protected only if it is identified. We therefore address recognition first, then surveillance, then sensitive populations.

2. Methods and Sources

The sources are of four kinds: official texts and resolutions (European Parliament, Council of Europe, European directive, the WHO classification and its mapping tables), checked against their text or their official summary; court decisions and ministerial answers, known from our files, with the exception of the judgment of the Cergy-Pontoise administrative court and the 2025 ministerial answer, checked against their text on October 20, 2026; peer-reviewed publications, read in full unless otherwise stated; and publications of institutions and associations, whose position is indicated. The studies by Schreier et al. (2006) and Byun et al. (2013), as well as the description by Schliephake (1932), are cited from the documents that report them; of [Fernández et al. \(2018\)](#), [Hillert et al. \(2002\)](#), [Divan et al. \(2008\)](#), and [Johansson \(2015\)](#), only the abstract was read. The German and Swiss sources (diagnose:funk, MedNIS), the report of the Danish association, and the Basta! investigation are reported from our files. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. A Syndrome Without an Entity (Questions 10a, 11g)

3.1 What the Institutions Say

In our view, every human being is electrosensitive to one degree or another, and electro-hypersensitivity designates its highest degrees; we regard it as a syndrome, a set of reactions of the body to an external source, and not as a disease.

The WHO fact sheet of December 2005, still online, regards the symptoms as real and links the syndrome to the broader category of “idiopathic environmental intolerance”: “The symptoms are certainly real and can vary widely in their severity. 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.” ([WHO, 2005](#)). In France, the 2018 report of Anses

(French Agency for Food, Environmental and Occupational Health & Safety) concludes that “no solid experimental evidence currently makes it possible to establish a causal link” between exposure and symptoms, while acknowledging that the suffering expressed corresponds “to a lived reality”; it considered the available prevalence data, ranging from 0.7% to 13.3%, to be unreliable, noted that the most recent data clustered around 5% (from 1.2% to 8.8%), with no study in the French general population, and recommended asking the Haute Autorité de santé (French National Authority for Health) to examine whether recommendations for care should be issued ([Anses, 2018](#)). In an Anses publication, three researchers distinguish, under the same name, an ability to perceive fields, an organic susceptibility, and a specific disorder; regarding the second, they write that nothing makes it possible to rule out that certain individuals, too few to be significantly represented in epidemiological studies, have a particular susceptibility to electromagnetic fields, while adding that the available analyses provide no lead for research ([Benamouzig et al., 2017](#)).

3.2 The Absence of a Code

We checked version 2026-01 of the ICD-11: no entity in it corresponds to “electromagnetic hypersensitivity,” “electrosensitivity,” or “idiopathic environmental intolerance” ([WHO, 2026](#)). An author who is directly affected describes the consequence: “WHO’s position, and the lack of an ICD code, leaves EHS individuals in medical limbo” ([Ashton, 2025](#)). In the absence of an entity, the European Academy for Environmental Medicine (EUROPAEM) proposes that physicians code the symptoms, then R68.8 (“Other specified general symptoms and signs”), with Z58.4 (exposure to radiation) and, for occupational exposure, Z57.1 ([Belyaev et al., 2016](#)). According to the WHO tables, these ICD-10 codes correspond to ICD-11 codes MG4Y, QD70.4, and QD84.Y; the last is a residual code (“Other specified occupational exposure to risk-factors”) that does not name radiation. They make it possible to document a case file; they do not make it possible to count.

3.3 A Self-Reported Prevalence

The available figures come from surveys in which respondents themselves report attributing their symptoms to electromagnetic fields. In Stockholm County, in 1997, 1.5% of the respondents to a survey of 15,000 residents reported being hypersensitive to electric or magnetic fields, the highest proportion being among women and in the 60–69 age group ([Hillert et al., 2002](#)). In Switzerland, a representative telephone survey conducted in 2004 found 5% of the population suffering from symptoms attributed to “electrosmog,” of whom only 13% had consulted their family doctor (Schreier et al., as cited in [Belyaev et al., 2016](#)). The German Federal Office for Radiation Protection puts the figure at about 1% and speaks of a “Selbstzuschreibung,” a self-attribution ([BfS, 2026](#)). In Taiwan, the same survey went from 13.3% in 2007 to 4.6% five years later; the authors note comparable declines in the Netherlands and Germany, suggest that “media reports affecting public awareness may partly explain the trend,” and calculate by meta-analysis an overall prevalence of 6.0% (95% confidence interval: 5.0 to 8.0%), higher among women ([Huang et al., 2018](#)).

These figures measure attribution, not the condition itself: they count together all individuals who link their symptoms to electromagnetic fields, whether or not they have obtained a diagnosis, and leave out those who present the same symptoms without ever linking them to their exposure. The

variation over time can be read in both directions—some of those affected recognize themselves only once the subject is known, and some of the reports may stem from the attention paid to the subject. No current data make it possible to decide.

4. Recognition in Europe: The Disability Route

4.1 The European Institutions

On April 2, 2009, the European Parliament adopted, by 559 votes to 22 with 8 abstentions, a resolution that calls on the Member States to “follow the example of Sweden and to recognise persons that suffer from electrohypersensitivity as being disabled so as to grant them adequate protection as well as equal opportunities” ([European Parliament, 2009](#)). Sweden does indeed treat electro-hypersensitivity as a functional impairment: it is the environment that is inadequate, and not the individual who is declared ill ([Johansson, 2015](#)). On May 27, 2011, the Parliamentary Assembly of the Council of Europe called on States to “pay particular attention to ‘electrosensitive’ people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network” ([Council of Europe, 2011](#), § 8.1.4). None of these texts is binding.

4.2 France: Case-by-Case Recognition

In France, recognition is obtained case by case, on the basis of an individual medical file. In 2015, the Toulouse disability litigation tribunal (tribunal du contentieux de l'incapacité) recognized an electro-hypersensitive woman as having an 85% incapacity rate, entitling her to the disabled adult allowance ([Toulouse Disability Litigation Tribunal, 2015](#)); in 2018, a social security tribunal (tribunal des affaires de sécurité sociale) recognized a workplace accident ([Yvelines Social Security Tribunal, 2018](#)); in 2019, an administrative court ordered a public institution to recognize the electro-hypersensitivity of one of its employees as service-connected, finding a “sufficient probability” of a link with the employee’s professional activity, while noting the absence of medical consensus on the causal link ([Cergy-Pontoise Administrative Court, 2019](#)); several courts have ordered, on medical grounds, the removal of smart meters or the installation of filters (from our files). Questioned in Parliament, the government replied on February 11, 2025, that the legal definition of disability allows the MDPH, the departmental disability centers, to “take into account the consequences of an individual’s state of health on their usual activities and their participation in social life, regardless of the diagnostic label” ([Assemblée nationale, 2025](#)). No court has ruled on the scientific question of the link between electromagnetic fields and symptoms; the two decisions cited in occupational matters accept a legal link between exposure at work and the condition, without basing it on a medical consensus. Conversely, the right to rehousing in a white zone has been refused, according to our files, and in 2025 a court of appeal relied on the Anses report to overturn the judgment that had allowed an electro-hypersensitive individual to remain in a white zone ([Aix-en-Provence Court of Appeal, 2025](#); see Document 1).

4.3 Germany, Switzerland, and Belgium

In Germany, social law defines disability through the interaction with attitudinal and environmental barriers; a radiation-protection advocacy association infers from this that electromagnetic fields constitute environmental barriers for the electro-hypersensitive ([diagnose:funk, 2025a](#)). According to a counselor at a disability counseling service, degrees of disability of up to 80% have been recognized, depending heavily on the assessment of the case officer; a letter written on behalf of the federal government's commissioner for disability matters states that a degree can be set even if electro-hypersensitivity is not named in the assessment scale ([diagnose:funk, 2025b](#)). In Switzerland, the consultation network mandated by the Federal Office for the Environment offers the patient a certificate “notfalls mit einer Beschreibung der funktionellen Impotenz anstelle der EHS-Diagnose, da nicht anerkannt”—if necessary with a description of the functional incapacity in place of the diagnosis, since it is not recognized ([MedNIS, 2026](#)). In Belgium, no specific recognition is documented; our own disability, at a rate above 66%, was recognized there (see the deposit text).

5. Surveillance Systems (Question 10)

Registries (10a). To our knowledge, there is no European registry of the electro-hypersensitive, and the absence of a code makes such a registry impossible within medical information systems. Cancer registries do exist; the trend they show for brain tumors is debated, with some studies reporting an increase in the incidence of certain tumor types in England and Sweden ([Frank et al., 2025](#)).

Occupational monitoring (10b, 11e). Directive 2013/35/EU on the protection of workers against electromagnetic fields requires a risk assessment and names workers at particular risk: those who carry implanted medical devices, such as cardiac pacemakers, or insulin pumps, and pregnant women; according to the official summary of the European Parliament, it “does not cover suggested long-term effects” ([European Parliament, 2013](#)). France transposed it through Decree No. 2016-1074 of August 3, 2016 ([French Republic, 2016](#)). For technicians who work on towers, a procedure for switching off the antennas exists, but a journalistic investigation reports that it is not always applied ([Basta!, 2013](#)). To our knowledge, the first symptoms described in staff working at short-wave transmitters—exhaustion, restless sleep, headaches, depressed mood—date back to 1932 (Schliephake, as cited in [Belyaev et al., 2016](#)).

Environmental monitoring (10c). See Document 3.

Cohorts (10d). We know of no European cohort following electro-hypersensitive individuals and controls over time, with measurement of their exposure. Large general cohorts provide signals: in the Danish National Birth Cohort, among 13,159 children, mobile phone exposure during pregnancy and after birth was associated with behavioral difficulties at the age of seven (odds ratio 1.80; 95% confidence interval: 1.45 to 2.23), an association that the authors acknowledged might not be causal ([Divan et al., 2008](#)).

Biomonitoring (10e). No biomarker has been validated (see Document 8). An Inserm study found in the skin fibroblasts of the 26 volunteers describing themselves as electro-hypersensitive, without exception, a delay in the nuclear migration of the ATM protein after irradiation, characteristic of

radiosensitivity, as well as two subgroups matching, at 64%, two profiles derived from a questionnaire analyzed blind; the authors themselves point out the small size of the cohort and a possible “group effect,” the volunteers belonging to the same association (Sonzogni et al., 2025).

Adverse event reporting (10f). See Document 8.

Case clusters (10g). Testimonies report symptoms appearing in several residents of the same building or the same neighborhood after an antenna was put into service. We know of no public mechanism responsible for investigating these reports, for example by measuring exposure before and after the installation; they remain unverified testimonies, which no body investigates.

Other sources (10h). Associations of the electro-hypersensitive produce surveys of their members, which are not representative: in 2019, the Danish association estimated, on the basis of a survey of its members, that the cost of electro-hypersensitivity to society would reach €136.8 million over ten years (Den Danske EHS Forening, 2019). The electro-hypersensitive are themselves a source: they detect, often before any official measurement, changes in their electromagnetic environment.

6. Sensitive Populations (Question 11)

Children (11a). For the same external field, the child absorbs more. In a simulation using four anatomical models, “children show 1.5–1.9 times higher whole-body SAR than adults at all sub-6 GHz frequencies”; at 2,140 MHz, a field set at the ICNIRP reference level brings the model of a six-year-old boy to 93% of the whole-body basic restriction on average and to 145% in the least favorable orientation, and the model of an eight-year-old girl to 122%, while “the adult phantoms stay below the restriction in every configuration”; the authors specify that these values correspond to the reference level and that, at the highest level measured in the environment, the least favorable configuration for the six-year-old model remains four thousand times below the basic restriction (Wydaeghe et al., 2026). Exposed to the base station antennas of Seoul, the brain of a six-year-old child absorbs about 28% more than that of an adult, and up to 50% more at 2 GHz (Lee and Choi, 2023). According to the authors of a modeling study, phone compliance testing has relied since 1997 on an adult male head phantom, whereas “young eyes and brains absorb substantially higher local radiation doses than adults” (Fernández et al., 2018, based on the abstract). Since 2015, French law has prohibited Wi-Fi in childcare spaces for children under three years of age, and Resolution 1815 recommends giving preference to wired connections in schools (§ 8.3.2).

Pregnant women (11b). European labor law classifies them among workers at particular risk (Directive 2013/35/EU). The Danish cohort cited above concerns prenatal exposure.

Older adults (11c). Data are scarce. In the Stockholm survey, the proportion of respondents reporting hypersensitivity was highest between the ages of 60 and 69 (Hillert et al., 2002).

Individuals with implanted medical devices (11d). European law recognizes the risk for workers who carry cardiac pacemakers or insulin pumps. We have found no equivalent binding provision for the public, even though those who carry these devices live in the same electromagnetic environment.

Highly exposed workers (11e). See Question 10b above.

Individuals with preexisting conditions (11f). EUROPAEM links electro-hypersensitivity to chronic multisystem illnesses of environmental origin, together with multiple chemical sensitivity, chronic fatigue syndrome, and fibromyalgia, and proposes grouping them in the ICD-11 (Belyaev et al., 2016). Interactions have been reported: among more than 2,400 Korean children, an increased risk of attention deficit hyperactivity disorder associated with phone use was observed only in children whose blood lead level was high (Byun et al., as cited in [Deutscher Bundestag, 2023](#)). The radiosensitivity found in the Inserm study (Section 5) points to another individual susceptibility to be explored.

Other (11g). The electro-hypersensitive themselves, and in particular the “wave refugees” (*réfugiés des ondes*); see Document 1.

7. Discussion

Electro-hypersensitivity is caught in a circle: without a recognized entity, no code; without a code, no registry; without a registry, no data; without data, no recognition. Europe partially escapes it by way of disability: Sweden, the European Parliament, and French and German administrations recognize the disadvantage suffered without settling the scientific question of the cause. This route protects individuals; it does not produce knowledge, since each recognition remains isolated, and it does not reduce exposure, which concerns the entire population (Recommendation 1). The notion of workers at particular risk further shows that European law already accepts that certain categories are exposed to particular risks from electromagnetic fields; it limits this recognition to work and to short-term effects. Dosimetric studies on children indicate that the reference level does not guarantee, for child models, compliance with the whole-body basic restriction around 2 GHz.

8. Limitations

Some of the prevalence data cited are old, and all rely on self-reporting. Several court decisions are known from secondary sources, and the favorable decisions do not represent all the decisions handed down. The Inserm study covers 26 volunteers, and its controls come from an earlier collection of the laboratory. The German and Swiss recognitions are reported by a radiation-protection advocacy association and by a consultation network, not by official statistics.

9. Recommendations (Questions 10, 11)

1. Reduce exposure at the source, before any other measure, throughout the territory and for the entire population, all human beings being electrosensitive to varying degrees: relocate or remove the antennas that expose homes, schools, and care facilities, connect everything that is fixed by cable or fiber, and abandon the objective of full mobile coverage of the territory (Documents 1 and 5).

2. Enable registration: use the existing codes without delay (MG4Y with QD70.4 or QD84.Y in the ICD-11) to document case files, pending a dedicated code, and create a voluntary registry of individuals reporting symptoms attributed to electromagnetic fields, linked to measurements of their exposure.
3. Conduct representative and repeated prevalence surveys, with a standardized questionnaire, that also record symptoms without asking respondents to attribute them.
4. Establish a prospective cohort of electro-hypersensitive individuals and matched controls, with measurement of exposure and of biomarkers, including the independent replication of the findings on radiosensitivity.
5. Establish a public protocol for investigating clusters of symptoms reported after the installation of a transmitter, with measurements before and after.
6. Extend to the public the notion of populations at particular risk—individuals with medical implants, pregnant women, children—and carry out compliance testing on child models.
7. Recognize electro-hypersensitivity as a functional impairment giving entitlement to accommodations (housing, school, hospital, work), and preserve the white zones that remain and reconstitute others, as recommended by Council of Europe Resolution 1815 (§ 8.1.4).

Glossary

Term	Meaning
ADHD	Attention deficit hyperactivity disorder.
Administrative court	French administrative court of first instance.
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
ATM, RIANs	The ATM protein takes part in DNA repair; RIANs (radiation-induced ATM nucleoshuttling) refers to its migration to the nucleus after irradiation, a delay in which is the signature of radiosensitivity.
Biomarker	Measurable biological parameter, in blood, urine, or a tissue, that provides information on a state or a process of the body.
Biomonitoring	Measurement, in the body, of substances or biological effects indicative of an exposure.
Blood lead level	Concentration of lead in the blood.
Case cluster	Grouping, in one place or period, of cases of the same disorder that are more numerous than expected.
Chronic fatigue syndrome	Myalgic encephalomyelitis: an illness characterized by disabling fatigue made worse by exertion, which the IOM proposed in 2015 to rename “systemic exertion intolerance disease.”

Term	Meaning
Chronic multisystem illnesses	Category proposed by EUROPAEM for disorders of environmental origin affecting several systems of the body: multiple chemical sensitivity, chronic fatigue syndrome, fibromyalgia, electro-hypersensitivity.
Cohort	Group of individuals followed over time to observe the occurrence or the course of a disorder.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
Directive 2013/35/EU	European directive of June 26, 2013, laying down the minimum health and safety requirements regarding the exposure of workers to electromagnetic fields.
Disability litigation tribunal, social security tribunal	Former French social courts (tribunal du contentieux de l'incapacité, tribunal des affaires de sécurité sociale), competent respectively for disability and for social security, abolished on January 1, 2019, and replaced by the social divisions of the courts.
Disabled adult allowance (AAH)	French social benefit (allocation aux adultes handicapés) that guarantees a minimum income to adults with disabilities.
Dosimetry	Assessment, by measurement or by calculation on anatomical models, of the energy absorbed by tissues.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Section 3.1).
Electrosmog	All the artificial electromagnetic fields to which a human being is exposed at a given moment.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
EUTB	Ergänzende unabhängige Teilhabeberatung: German independent counseling services intended for individuals with disabilities.
Fibroblast	Connective tissue cell; skin fibroblasts are easy to culture and are used for radiosensitivity tests.
Fibromyalgia	Syndrome combining widespread pain, fatigue, and sleep disorders, with no validated biological marker.
Functional impairment	Swedish conception of disability, which locates the obstacle in an unsuitable environment rather than in an illness of the individual.
German Federal Office for Radiation Protection	Bundesamt für Strahlenschutz (BfS): German public agency responsible for protection against radiation.
Haute Autorité de santé	French National Authority for Health: French public authority responsible, among other tasks, for drawing up good practice guidelines for health professionals.
HHS	Department of Health and Human Services: U.S. federal health department, to which this contribution is addressed.

Term	Meaning
ICD-10, ICD-11	International Classification of Diseases of the WHO, tenth and eleventh revisions. In it, R68.8 designates “Other specified general symptoms and signs,” Z58.4 exposure to radiation, and Z57.1 occupational exposure to radiation; MG4Y, QD70.4, and QD84.Y are the corresponding ICD-11 codes, in force since 2022.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
IEI-EMF	Idiopathic environmental intolerance attributed to electromagnetic fields (IEI-CEM in French): term adopted by the WHO and Anses; “idiopathic” means that the cause is unknown.
Inserm	Institut national de la santé et de la recherche médicale (French National Institute of Health and Medical Research): French public body for biomedical research.
IOM	Institute of Medicine, now the National Academy of Medicine: U.S. academy that advises the federal government on health matters.
MDPH	Departmental disability centers (maisons départementales): French public offices that assess disability situations and open the corresponding entitlements.
MedNIS	Swiss medical advisory network on non-ionizing radiation, set up in 2023 under a mandate from the Federal Office for the Environment.
Meta-analysis	Statistical analysis that combines the results of several studies.
Multiple chemical sensitivity	Syndrome of symptoms affecting several organs upon exposure to various chemical substances at concentrations well below those that affect the general population.
Odds ratio, confidence interval	Statistical measure of the association between an exposure and an effect; a value greater than 1 indicates an association, and the 95% confidence interval gives the range of values compatible with the data.
Prevalence	Proportion of a population presenting a disorder at a given time.
Radiosensitivity	Increased sensitivity of an individual or of their cells to ionizing radiation.
Reference level, basic restriction	The basic restriction limits the energy absorbed in the body; the reference level limits the field measurable outside the body and is supposed to guarantee compliance with the former.
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Service connection (imputabilité au service)	In French civil service law, recognition that an illness or an accident results from the performance of one's duties; for public employees, the equivalent of an occupational disease.
SGB IX	Ninth Book of the German Social Code (Sozialgesetzbuch), devoted to rehabilitation and to the participation of individuals with disabilities.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).

Term	Meaning
WHO	World Health Organization.
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 5 — Technologies and Infrastructure: Exposures That Add Up, a Network Mesh That Leaves No Place Out of Reach

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 13 (a to k); 15 (d, e). Items 15a to 15c are addressed in Document 1.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

This document examines the eleven technologies listed in Question 13 and two aspects of Question 15, small cells and livestock. Three findings emerge. First, each technology is assessed in isolation, against limits based on heating, whereas their emissions add up in the same places and on the same bodies; for several of them, the health literature is virtually nonexistent, as the French agency itself acknowledges for smart meters, and, to our knowledge, no health study has been devoted to satellite constellations. Second, deployment now aims at coverage without gaps: small cells exempted from individual permits and designed to go unnoticed, road coverage obligations, a 6G framework built on ubiquitous connectivity, and satellites linked directly to phones, announced as a means of covering the areas that nature protection or terrain had kept out of reach. The last white zones, which the electro-hypersensitive need in order to live and which also protect the rest of the living world, are thus disappearing by design, not by accident. Third, livestock farming provides observations that do not depend on symptoms reported by the subjects themselves — mortality, milk production, calf cataracts; to our knowledge, no French collective expert assessment is devoted to radiofrequency in livestock farming, and the experiment ordered by a French judge — switching off a base station antenna in order to observe a herd — never took place. The document sets out six recommendations.

1. Purpose

Question 13 of the Request for Information asks how, according to scientific evidence, several technologies affect cumulative exposure patterns: 5G (a), 6G (b), Wi-Fi (c), satellite-based communications (d), the Internet of Things (e), wearable technologies (f), smart homes and

appliances (g), smart cities (h), autonomous vehicles (i), wireless medical devices (j), and smart meters (k). Question 15 asks what types of evidence should be considered when evaluating exposure associated with wireless infrastructure; here we address small-cell deployment (15d) and livestock (15e). Proximity to homes, cumulative neighborhood exposure, and antenna density (15a to 15c) are addressed in Document 1; environmental effects (Question 14), in Document 6.

2. Methods and Sources

The sources fall into four categories: European regulatory texts and decisions of the French telecommunications regulator (Arcep), consulted in their original text; the opinion of Anses (French Agency for Food, Environmental and Occupational Health & Safety) on smart meters, read in full; peer-reviewed publications, read in full or from their abstracts, as indicated; and industry press releases and press articles, whose standpoint is indicated. For the European regulation on small cells, we read the recitals. The Swiss study on calf cataracts ([Hässig et al., 2009](#)) was read in its abstract and methods; the study on connected household devices ([Joyner et al., 2024](#)) and the study on interference in intensive care ([van der Togt et al., 2008](#)), from their abstracts; the EUROPAEM guideline ([Belyaev et al., 2016](#)), in full, in its French translation; the IEEE 802.11bb standard, from its overview page; the study by [Bellieni et al. \(2008\)](#) on incubators, from its abstract; the recommendations of the Electrosensitive Society and of POEM 26, associations of the electro-hypersensitive and for prevention, from our files. The court decisions in the Haute-Loire case were consulted in their original text; the Calvados case is known from the press. We do not name the farmers. The link in each reference leads to the online source where one exists. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. Technologies and Cumulative Exposure (Question 13)

3.1 An Addition That No Assessment Takes into Account

The shift from a small number of powerful, distant transmitters to a multitude of weaker sources, installed as close as possible to the body, is described in Document 1 (Section 3.4). The sections that follow show that each technology adds its own layer. Yet assessment remains organized technology by technology: Anses issued separate opinions on 5G and on smart meters, and the French protocol for measuring base station antennas recommends switching off, during the measurement, equipment with non-permanent emissions, including phones (Document 3, Section 4.1). Long-term comparisons, such as the one conducted in New York, point to a substantial increase in urban exposure (Document 3, Section 3.4). No public mechanism assesses what a single individual receives over the course of a day when exposed at the same time to base station antennas, Wi-Fi, a cordless phone, connected devices, the meter, and their own mobile phone.

3.2 5G (13a)

In France, the licenses for the 3.4–3.8 GHz band require operators to cover highway-type roads in 2025 (16,642 km, about 10,340 miles) and main roads in 2027 (54,913 km, about 34,120 miles); the throughput of at least 240 Mbit/s, required at 75% of sites from 2022, is to be gradually extended to all sites by 2030, and one quarter of the sites in the last milestones must be located in an area combining sparsely populated municipalities and industrial territories, outside the main urban areas (Arcep, 2019). Beamforming antennas concentrate their signal on the user; a recent simulation shows that at 3,500 MHz, a field set at the ICNIRP reference level leads to the local basic restriction being exceeded for all four anatomical models studied, adults and children (Wydaeghe et al., 2026; see Document 3, Section 4.3). 5G therefore changes exposure in two ways: it extends coverage to areas that were previously poorly served, and it makes local exposure variable and concentrated, which a spot measurement captures poorly.

3.3 6G (13b)

No commercial 6G network exists in 2026; the International Telecommunication Union (ITU) envisages it “for 2030 and beyond.” The framework defined by the ITU (ITU-R, Recommendation M.2160) sets out six usage scenarios, including “Ubiquitous Connectivity,” which provides for interworking between terrestrial and non-terrestrial networks — satellites, high-altitude platform stations, unmanned aircraft — and “Integrated Sensing and Communication,” through which the network also serves as a sensor of presence and movement (ITU-R, 2023). The frequency bands have not been decided; a mid-band range of around 7 to 24 GHz is under study. In the simulation already cited, at 7 GHz and under simplified beamforming, the absorbed power density reaches 103% of the basic restriction for the six-year-old boy model (Wydaeghe et al., 2026). The 6G framework is thus being set before any health assessment of the bands it will use has been conducted.

3.4 Wi-Fi (13c) and DECT Cordless Phones

Wi-Fi is an indoor, permanent, and nearby source, present in homes, schools, shops, and transportation; on-board Wi-Fi helps make public transportation inaccessible to the electro-hypersensitive (Document 1, Section 6.1). Council of Europe Resolution 1815 nevertheless nevertheless recommends, for children, “particularly in schools and classrooms, give preference to wired Internet connections” (Council of Europe, 2011, § 8.3.2). Wi-Fi is the technology for which the alternative is simplest: cable provides the same service without radiation.

The household cordless phone, which Question 13 does not mention, follows the same logic. The base of an ordinary DECT cordless phone transmits even when idle, with no call in progress, and stops transmitting only in ECO mode (Document 7, Section 5.1). In our experience, many homes are still equipped with old DECT phones, often lacking this mode, whose users do not know that the base transmits continuously, day and night. Here too an alternative exists: a corded phone, recommended by EUROPAEM (Belyaev et al., 2016), plugs into the telephone port of the home internet router.

3.5 Satellite Communications (13d)

Low Earth orbit constellations, including Starlink, communicate with ground terminals in the Ku band, between approximately 10.7 and 14.5 GHz. The available estimates of the power received on the ground come from engineering calculations, not from health assessments; we found no health study, no independent measurement, and no data on the uplink emission of the terminal, even though it is the source closest to the user. The absence of data is not proof of harmlessness.

The decisive development is the direct link between the satellite and the ordinary phone, without a dedicated terminal, in bands close to those of mobile telephony. On March 2, 2026, Deutsche Telekom announced, under the title “Telekom closes the last whitespots in Europe with Starlink satellite-to-mobile,” a service planned from 2028 in several European countries, intended for “areas where network expansion is particularly challenging, for example due to nature conservation requirements,” or because of difficult terrain ([Deutsche Telekom, 2026](#)). On February 27, 2026, Satellite Connect Europe, a joint venture of Vodafone and AST SpaceMobile, announced a service intended to “extend mobile coverage beyond the limits of terrestrial networks,” compatible with existing 4G and 5G smartphones ([Vodafone, 2026](#)); Orange joined the venture in March 2026 ([Ur Rehman, 2026](#), based on Reuters). The areas that nature protection or terrain had kept clear of the terrestrial network are thus expressly targeted.

Constellations also pollute the sky. Observations with the European radio telescope LOFAR show that second-generation Starlink satellites emit, outside their communication bands, unintended radio radiation up to 32 times more intense than that of the previous generation ([Bassa et al., 2024](#)); the Netherlands Institute for Radio Astronomy, which operates LOFAR, sees in it “a growing threat to the integrity of astronomical observations” ([ASTRON, 2024](#)). This radiation falls on every place, including the radio quiet zones that regulations protect on the ground, such as the one at Green Bank (Document 1, Section 7.1). No terrestrial regulation can shield a territory from a constellation that passes over it.

3.6 The Internet of Things, Wearable Technologies, and Smart Homes (13e, f, g)

A study of smart-connected homes measured, over three years, 43 devices in 16 categories in occupied homes, and 12 more in the laboratory. According to the predictive software derived from it, one device from each of the 23 categories, operating near its maximum power, would produce in total, at 1 meter (about 3 feet), 0.17% of the ICNIRP limit; in two test apartments equipped with more than 50 and more than 100 devices driven to the maximum, the six-minute average exposure reached 0.0077% and 0.44% of that limit ([Joyner et al., 2024](#)). These results are expressed relative to a limit based on heating and say nothing about non-thermal effects. Radio modules are also finding their way into appliances that had no need for them: we had to return to the seller a camping refrigerator equipped with Bluetooth. Private antennas used to control devices — service robots in restaurants, for example — do not appear, to our knowledge, in any public inventory. Our files contain no measurement of the cumulative exposure due to wearable technologies; these place a transmitter in contact with the skin, continuously, sometimes during sleep.

3.7 Smart Cities and Autonomous Vehicles (13h, i)

The smart city relies on a mesh of sensors and of small cells installed on street furniture (Section 4.1). The connected, then autonomous, vehicle requires continuous road coverage, which Arcep's obligations organize (Section 3.2). The vehicle itself becomes a transmitter: since March 31, 2018, every new type of passenger car and light commercial vehicle type-approved in the Union must be fitted with the eCall in-vehicle emergency call system, which includes a mobile communication module ([Regulation \(EU\) 2015/758](#)). For the electro-hypersensitive, whose only means of travel often remains the private car, neither electric nor hybrid, on secondary roads (Document 1, Section 6.1), these two developments combine: vehicle and road are coming under coverage together.

3.8 Wireless Medical Devices (13j)

Wireless medical devices are both sources, worn or implanted in contact with the body, and devices vulnerable to the emissions of other sources. Of 41 intensive care devices tested without a patient connected, under controlled conditions, two radiofrequency identification systems caused 34 interference incidents in 123 tests, 22 of which were classified as hazardous ([van der Togt et al., 2008](#)). The hospital thus concentrates transmitters at the moment when the body is most fragile; for the electro-hypersensitive, it has often become inaccessible (Document 1, Section 6.2).

The bed itself is a source. An electric medical bed, in the hospital as at home, carries motors, a power supply, a control unit, and their cables beneath the mattress. As long as it remains plugged in, its wiring exposes the body lying on it to the 50 Hz electric field; its motors and power supply, when energized, add a magnetic field, and switched-mode power supplies, like those of most electronic devices, produce the high-frequency transients known as “dirty electricity.” We found no study that measures the exposure of a patient lying in such a bed. The closest equipment that has been studied is the incubator: in 43 newborns, switching off the incubator motor changed their heart rate variability, whereas changes in background noise had no effect, and the authors see in this an influence of its electromagnetic fields on the autonomic nervous system ([Bellieni et al., 2008](#)). Associations recommend that facilities unplug electric beds and electric examination tables when they are not in use, and prefer gravity infusions to electric pumps ([Electrosensitive Society, 2026](#); [POEM 26, 2017a](#); [POEM 26, 2017b](#)). We know of no official recommendation on these sources, even though patients spend most of their stay in this bed, nights included.

3.9 Smart Meters (13k)

In France, the Linky electricity meter communicates by power line communication (PLC), between approximately 35 and 91 kHz, over the home's wiring; the Gazpar gas meter transmits at 169 MHz, and smart water meters, depending on the utility, at 169 MHz or in the 868 to 870 MHz band. The revised 2023 Anses opinion concludes that it is “very unlikely” that these exposures cause health effects ([Anses, 2023](#), p. 24), but it notes that “there is practically no scientific literature addressing the specific health effects of exposure to smart meters” ([Anses, 2023](#), p. 19). The same opinion observes that “in a home not equipped with a Linky meter, but located near other homes already fitted with one, exposure to PLC signals exists, albeit at lower exposure levels” (p. 13); it recommends “continuing to study the possible health effects of exposure to electromagnetic fields

in the frequency range between 1 kHz and 30 MHz” (p. 22), while noting that the additional tax on the IFER (France’s flat-rate tax on network companies), which funded the annual “radiofrequency and health” research program, was abolished in 2019 (p. 23). The reassuring conclusion therefore rests on the low exposure levels measured and on the general literature on radiofrequency, not on health studies specific to the meters. The measurement of these signals is addressed in Document 3 (Section 4.5).

4. Infrastructure (Question 15d, e)

4.1 Small-Cell Deployment (15d)

Implementing Regulation (EU) 2020/1070 specifies the characteristics of “small-area wireless access points,” the deployment of which should be “facilitated through a permit-exempt deployment regime” (recital 1). This equipment – up to 10 watts of equivalent isotropically radiated power for the most powerful class, with a lowest radiating part that may be only 2.2 meters (about 7 feet) above the sidewalk, a height chosen to ensure a distance of at least 20 centimeters (about 8 inches) between the main lobe of the antenna and the body of a 2-meter-tall (about 6.5-foot-tall) individual (recital 8) – must be “either invisible to the general public or mounted in a visually non-obtrusive way” (recital 3); its installation is notified “no later than two weeks after the installation” (recital 11). Access points equipped with an active antenna system, that is, with beamforming, are for the time being excluded from this regime (Article 1 and recital 13). The European regime thus organizes a deployment without individual permits, without prior notice to local residents, and designed to go unnoticed.

At the end of pilot deployments carried out with the operators, the French National Frequency Agency (ANFR) concluded that “the average exposure level is not changed by the commissioning of the small antennas,” while noting that near one of them “the exposure level is of the same order of magnitude as that which a macro network can create” (ANFR, 2018). A small cell therefore recreates, a few meters from passersby and windows, the exposure of a macro antenna, and an area-wide average erases this finding. The data to be considered are therefore the levels as close as possible to small cells, in the homes facing them, combined with those of macro antennas and under beamforming, and not an area-wide average. Resolution 1815 calls for the siting of any new antenna to be determined “not solely according to the operators’ interests but in consultation with local and regional government authorities, local residents” (Council of Europe, 2011, § 8.4.4): the exemption regime does the opposite.

4.2 Livestock (15e)

In France, livestock disorders attributed to electricity have been examined since 1999 by the Permanent Group for Electrical Safety in Agriculture (GPSE), under the aegis of the Ministry of Agriculture, whose mandate covers electricity problems in livestock farming – internal installations, high-voltage lines – and, to our knowledge, not the radiation from base station antennas. For wind turbines, Anses delivered in December 2021, at the request of the ministries responsible for the environment and for agriculture, an expert assessment of the disorders

observed on two farms in the Loire-Atlantique department ([AFP, 2021](#)). We have identified no equivalent expert assessment on radiofrequency in livestock farming.

In the Haute-Loire department, a 3G and 4G base station antenna was brought into service 250 meters (about 820 feet) from a dairy farm, gradually by the four operators, between June 28 and July 26, 2021. The farm reports a fourfold increase in mortality and an average production that fell from 60,214 liters per month in 2019 and 66,934 in 2020 to 43,000 in 2021 and 42,500 in 2022. The expert appointed by the Le Puy-en-Velay Judicial Court asked for the antenna to be switched off in order to observe the herd; since the judicial court had declared that it lacked jurisdiction to order this, the interim relief judge of the Clermont-Ferrand Administrative Court ordered, on May 23, 2022, that the antenna be switched off for two months, a measure deemed “necessary to enable the court-appointed expert to carry out his mission”; at the hearing, the expert had described a herd “in a state of real suffering” ([Clermont-Ferrand Administrative Court, 2022](#)). The Conseil d’État (France’s highest administrative court) annulled this order on August 17, 2022: the measure obstructed the execution of administrative decisions, and no serious danger had been shown — “although the GAEC reports a high mortality rate in its herd, it does not establish it” ([Conseil d’État, 2022](#)). The antenna was not switched off, the observation requested by the expert did not take place, and, to our knowledge, no court has ruled on the link between the antenna and the condition of the herd.

In the Calvados department, a farming family reports, after the installation of an antenna in 2023 a few meters from its site, “in eighteen months, we lost 90 cattle,” followed by a return to normal mortality after the herd was moved 20 kilometers (about 12 miles) away in 2025. The authorities dispute this explanation — “Not all the animals are exposed to the 4G antenna [...] When they were moved, they were in the same condition” — and the herd was removed in July 2026 on suspicion of mistreatment; an investigation is under way ([France 3 Normandie, 2026](#), as recorded in our files). We report both versions without deciding between them.

In Switzerland, a cohort study examined 253 calves from 229 farms, reconstructing the places where each calf and its dam had stayed since insemination. It found nuclear cataract in 32% of the calves, severe in 3.6%, and, for exposure in the first trimester of gestation, an odds ratio for severe cataract of 2.50 (95% confidence interval: 1.21 to 5.20) per unit of the logarithm of the field strength of the nearest base station within a 2 km (about 1.2-mile) radius, and of 3.10 (1.36 to 7.08) for all stations within a 10 km (about 6-mile) radius, compared with calves free of cataract ([Hässig et al., 2009](#)). The authors also report oxidative stress associated with the distance to the nearest station, while specifying: “It has not been shown that the antennas actually affected stress”; according to them, nuclear cataract can have many other causes, and the influence of fields during embryogenesis calls for further studies.

The data to be taken into account for livestock are therefore farm records — mortality, production, fertility, veterinary examinations — their chronology relative to the commissioning or modification of an antenna, the exposure measured in the buildings, and situations of shutdown, suspension, or relocation that allow a before-and-after comparison. These observations have particular value: the

animal does not report its symptoms, and the objection of self-attribution or of a nocebo effect raised against the electro-hypersensitive cannot be raised against it.

5. Discussion

Question 13 asks how these technologies affect cumulative exposure patterns. They add up: each adds a layer of sources, ever closer and ever more numerous, inside and outside homes. Assessment, for its part, remains fragmented, technology by technology, against thermal limits; for several technologies, the health literature is virtually nonexistent, and deployment precedes assessment instead of following it. The Haute-Loire case sums up the situation: the judge had ordered the simplest experiment, switching off the antenna and observing the herd, and it did not take place. The burden of proof rests on those who undergo the exposure, not on those who create it.

The common feature of the technologies examined is the goal of coverage without gaps: road obligations, exempted and invisible small cells, the ubiquitous connectivity of 6G, satellites announced as a means of covering areas protected for nature and difficult terrain. White zones are disappearing not by accident but by design. Yet they are the condition of life for the electro-hypersensitive, for whom a mere reduction in exposure is not enough, and a refuge for the rest of the living world (Document 6). The satellite is not a solution: its health effects have not been studied, its pollution of the sky is documented, and it eliminates precisely these last refuges.

For fixed uses, an alternative exists: a wired connection, by cable or optical fiber, provides the same service without radiation. As early as 2011, Resolution 1815 called on member states to “encourage research to develop telecommunication based on other technologies which are just as efficient but whose effects are less negative on the environment and health” ([Council of Europe, 2011](#), § 8.1.5). These other technologies exist. Inside buildings, light itself can carry data: LiFi transmits by modulated light—in the standard, the near infrared, from 800 to 1,000 nanometers—without radiofrequency, and does not pass through walls; IEEE, the body that established the Wi-Fi standard, incorporated it into that standard in 2023 ([IEEE, 2023](#)). Optical fiber now reaches homes, but inside them Wi-Fi most often takes over. The choice was made to move fast, by covering the planet with transmitters of high-frequency waves, rather than to develop safer technologies.

6. Limitations

For several technologies — 6G, wearable technologies, autonomous vehicles — our files describe deployment frameworks, not measured exposures. The Deutsche Telekom and Satellite Connect Europe announcements are corporate press releases; their timelines may change. In the Haute-Loire case, the mortality and production figures are those of the farm, and the Conseil d’État considered the mortality not established; in the Calvados case, known from the press, the authorities dispute the explanation put forward by the farmers; the Swiss study is observational, based on theoretical field strengths, without on-site measurement, and its authors themselves stress the multiplicity of possible causes. Section 3.8 describes the sources in an electric medical

bed without any measurement of the exposure it produces. Several studies are cited from their abstracts, as indicated in Section 2.

7. Recommendations (Questions 13 and 15)

1. Assess the cumulative exposure from all the sources present in the same place — base station antennas, satellites, Wi-Fi, connected devices, meters, personal devices — instead of separate assessments by technology against thermal limits, and reduce it at the source throughout the territory.
2. Make the deployment of any new generation or band — 6G, millimeter waves, integrated sensing, direct satellite coverage of phones — conditional on a prior, independent assessment of its effects on health, on the living world, and on the sky, funded independently of industry.
3. Connect all fixed uses — homes, schools (§ 8.3.2 of Resolution 1815), care facilities — by cable or fiber, guarantee, at no extra cost, non-communicating meters and household appliances whose radio function can be removed, and abandon the objective of full mobile coverage of the territory, which leads to antennas being installed everywhere.
4. Subject small cells to individual authorization and to prior notice to local residents, in the spirit of § 8.4.4 of Resolution 1815, which calls for the siting of antennas to be determined in consultation with local residents, instead of an exemption regime combined with notification after installation.
5. Preserve the white zones that remain, including with respect to direct satellite coverage of phones, and recreate new ones, for the electro-hypersensitive and for the rest of the living world; exclude areas protected for nature from such coverage.
6. Entrust an independent body with a collective expert assessment of radiofrequency in livestock farming, keep a register of reports from farmers, and, as a precautionary measure, suspend the emissions of an antenna when a documented coincidence appears between its commissioning and livestock disorders.

Glossary

Term	Meaning
4G, 5G, 6G	Fourth, fifth, and sixth generations of mobile telephone networks. 6G has not yet been deployed.
Administrative court (<i>tribunal administratif</i>)	French first-instance administrative court.
ANFR	Agence nationale des fréquences (French National Frequency Agency): French public body responsible for managing radio frequencies and monitoring public exposure to waves.

Term	Meaning
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
Arcep	Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (French Regulatory Authority for Electronic Communications, Postal Affairs and Print Media Distribution): independent French administrative authority which, among other things, sets the coverage obligations of operators.
ASTRON	Netherlands Institute for Radio Astronomy, which operates the LOFAR radio telescope.
Beamforming	Technique by which an antenna concentrates its signal in the direction of the user instead of emitting it uniformly.
Bluetooth	Short-range radio link between devices, around 2.4 GHz.
Conseil d'État	France's highest administrative court; among other things, it rules in last resort on appeals against the interim relief orders of administrative courts.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
Department (département)	French administrative division; Haute-Loire and Calvados are two of them.
Direct satellite-to-phone link	Connection of an ordinary mobile phone to a satellite, without a terrestrial antenna or dedicated terminal (also called <i>direct-to-device</i> or <i>direct to cell</i>).
Dirty electricity	High-frequency transients superimposed on the 50 Hz mains current, produced in particular by switched-mode power supplies, dimmers, and electronic lighting.
eCall	Automatic in-vehicle emergency call system, mandatory since March 31, 2018, in new types of passenger cars and light commercial vehicles type-approved in the European Union.
ECO mode	Mode of DECT cordless phones in which the base stops transmitting, or transmits only very weakly, when no call is in progress.
Electric medical bed	Bed with adjustable height and inclination, usually motorized, used in hospitals, care facilities, and at home.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
Equivalent isotropically radiated power	Power that would have to be supplied to an antenna radiating equally in all directions to obtain the same field in the main direction of the antenna under consideration.
EU	European Union.

Term	Meaning
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
GAEC	Groupement agricole d'exploitation en commun: a form of French farming partnership.
GPSE	Groupe permanent pour la sécurité électrique en milieu agricole (Permanent Group for Electrical Safety in Agriculture): French body created in 1999 under the aegis of the Ministry of Agriculture, responsible for livestock disorders of electrical origin.
Heart rate variability	Variation in the interval between two heartbeats; it reflects the activity of the autonomic nervous system.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
HHS	Department of Health and Human Services: U.S. federal health department, to which this contribution is addressed.
IEEE	Institute of Electrical and Electronics Engineers: international professional association of engineers, which establishes, among other things, the Wi-Fi standards.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
Internet of Things	Set of devices and sensors connected to one another and to the network, most often by radio link.
ITU-R	Radiocommunication Sector of the International Telecommunication Union, a specialized agency of the United Nations.
Ku band	Frequency band used for satellite communications; here, approximately 10.7 to 14.5 GHz.
LiFi	Data transmission by modulated light, visible or infrared, without radiofrequency; it does not pass through walls.
Linky, Gazpar	French smart meters, for electricity (grid operator Enedis) and for gas (GRDF), respectively.
LOFAR	Low Frequency Array: European network of radio telescopes observing at low frequencies.
Low Earth orbit	Orbit at an altitude below 2,000 km, used by constellations of telecommunications satellites.
Macro antenna	Conventional high-power mobile base station antenna, installed on a tower or a rooftop and covering a wide area.
Nocebo effect	Onset of symptoms attributed to the expectation of a harmful effect, and not to the agent itself.
Nuclear cataract	Clouding of the central part (nucleus) of the lens of the eye.

Term	Meaning
Odds ratio, confidence interval	Statistical measure of the association between an exposure and an effect; a value greater than 1 indicates an association, and the 95% confidence interval gives the range of values compatible with the data.
Oxidative stress	Imbalance between the production of oxidizing compounds and the body's defenses.
Power line communication (PLC)	Data transmission by superimposing a signal of a few tens of kilohertz on the electric current of existing wiring.
Radio quiet zone	Area where radio emissions are restricted by law to protect radio astronomy observations, as around Green Bank (United States).
Recital	In a European Union text, a statement of reasons set out in the preamble, before the articles.
Référé (interim relief)	Emergency procedure by which a judge orders provisional measures.
Reference level, basic restriction	The basic restriction limits the energy absorbed in the body; the reference level limits the field measurable outside the body and is supposed to guarantee compliance with the former.
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Small cell	Low-power, short-range antenna installed close to the ground, on street furniture or building facades; "small-area wireless access point" in European Union law.
Starlink	Low Earth orbit satellite constellation of the U.S. company SpaceX.
Switched-mode power supply	Electronic power supply that converts mains current by rapid switching; present in most electronic devices, it produces high-frequency transients.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 6 — Fauna and Flora: What Nonhuman Life Teaches Us About Radiofrequency Radiation

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Question addressed: 14.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

This document brings together the scientific evidence on the effects of radiofrequency radiation on fauna and flora. No exposure limit has been established for nonhuman life: the limits in force were designed for human beings and are verified at the places human beings frequent, whereas birds nest on antenna supports and insects fly in contact with transmitters. The available studies are of two kinds. Controlled experiments show that the orientation of migratory birds and bats is disrupted by very weak radio noise, far below the limits, and that plants respond to radiofrequency radiation through identified cellular mechanisms. In the laboratory, *Ixodes ricinus* ticks, the main vector of Lyme disease in Europe, move toward an area exposed to 900 MHz, and do so even more when they are infected with *Rickettsia*. Field observations associate proximity to mobile phone antennas with reduced reproduction in the white stork, lower sparrow density, high tadpole mortality, and damage to trees on the exposed side. These observations are disputed on methodological grounds, and, to our knowledge, none has been taken up in a public research program. European institutions conclude that there is no solid evidence of harmful effects under realistic conditions, while themselves noting that high-quality field studies are rare. In the United States, the Department of the Interior judged as early as 2014 that federal standards were inappropriate for wildlife, and in 2021 a federal court faulted the Federal Communications Commission (FCC) for failing to respond to comments on environmental harm. Living beings can neither move away from the sources nor be suspected of a nocebo effect: their protection requires reduction at the source and the preservation of areas free of artificial radiation.

This document sets out seven recommendations.

1. Purpose

Question 14 of the Request asks what scientific evidence exists on the potential adverse effects of radiofrequency radiation on the environment. We answer it for wildlife, for trees and plants, and for the sky. Livestock is addressed in Document 5 (Section 4.2); changes in ambient levels, synthesized by [Levitt et al. \(2022a\)](#), in Document 1 (Section 3.1).

2. Methods and Sources

The sources are of four kinds: peer-reviewed publications; literature reviews from all sides of the debate; documents from European and U.S. public bodies, consulted in their original text; and press releases from universities and institutes, whose position is stated. The articles by Levitt, Lai, and Manville and their coauthors (2022–2025), Alfonso Balmori’s work on storks, sparrows, and tadpoles, the study of trees in Bamberg and Hallstadt, and the reviews by [Verschaeve and Bervoets \(2012\)](#), by the European EKLIPSE project (2018), and by [Cucurachi et al. \(2013\)](#) were consulted when our files were compiled. The report of the German Federal Office for Radiation Protection ([Pophof et al., 2023](#)) was also analyzed; its conclusions are reported without verbatim quotation. The bat study by [Lindecke et al. \(2026\)](#), the insect study by [Thielens et al. \(2018\)](#), and the study by [Everaert and Bauwens \(2007\)](#) are cited from their abstracts, and the first also from the University of Oldenburg press release; the robin study by [Engels et al. \(2014\)](#), from the press release of the same university. On ticks, the articles by [Vargová et al. \(2022\)](#) and [Bañas et al. \(2023\)](#) were read in full, and those by [Vargová et al. \(2018\)](#) and [Frątczak et al. \(2020\)](#) from their abstracts; the Dernières Nouvelles d’Alsace report is cited from a viewing by one of us, the video not having been transcribed. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. An Exposure the Standards Overlook

No exposure limit has been set for animals and plants. The ICNIRP limits, adopted in Europe, and the FCC limits in the United States were established for the human body, on the basis of tissue heating, and compliance with them is verified at locations accessible to the public. Levitt, Lai, and Manville distinguish emissions, which characterize the field at the source, from exposures, which are absorbed by an organism ([Levitt et al., 2022d](#)). Compliance checks are carried out at ground level or in places accessible to the public, not at antenna height, where birds nest and insects fly; in the near field, an installation can be deemed compliant even though levels there exceed federal limits by several thousand times ([Levitt et al., 2025](#)). The report of the German Federal Office for Radiation Protection itself notes that flying species—insects, birds, and bats—can come closer to transmitters than human beings, and that biological effects should be studied more closely in the field ([Pophof et al., 2023](#)). A simulation on insect models further shows that absorbed power increases with frequency: a shift of 10% of the incident power density to frequencies above 6 GHz would lead to “an increase in absorbed power between 3–370%” ([Thielens et al., 2018](#)), which directly concerns the high 5G bands and those envisaged for 6G (Document 5).

For wildlife, Levitt and coauthors propose a specific absorption rate (SAR) of 0.003 W/kg and a power density of 0.005 mW/cm² (Levitt et al., 2025); this power density is two hundred times lower than the ICNIRP reference level for the public above 2 GHz, which is 10 W/m².

4. What the Studies Show

4.1 Orientation in Migratory Species

The most rigorous experiment concerns the European robin. In wooden huts on the University of Oldenburg campus, migrating robins lost their magnetic orientation; when the huts were shielded with aluminum sheets, which attenuate time-varying fields without altering the Earth's magnetic field, they regained it, and lost it again, under double-blind conditions, as soon as the grounding of the shield was disconnected or broadband noise was added (Engels et al., 2014). The noise in question lay between 2 kHz and 5 MHz, at intensities on the order of one-thousandth of the World Health Organization (WHO) limit; according to the university, "This interference does not stem from power lines or mobile phone networks": it was mainly produced by electronic devices (University of Oldenburg, 2014). The result therefore does not concern mobile phone frequencies; it establishes that an essential biological function is disrupted by artificial radiation far below the limits, through a nonthermal mechanism.

A comparable result was published in May 2026 for bats. On the Baltic coast of Latvia, migratory soprano pipistrelles were exposed to radiofrequency fields from 0.01 to 300 MHz, then tested later in the night: "Whereas control bats oriented normally, bats exposed to RF noise exhibited random departure flight orientation, suggesting disruptive effects lasting beyond immediate exposure" (Lindecke et al., 2026). The noise was weak; for the lead author, the applicable limits protect human beings without taking wildlife into account, and "Our results show that wild animals can be affected well below these thresholds" (University of Oldenburg, 2026). The authors conclude that electromagnetic pollution could have a greater effect on animal behavior than previously assumed.

Magnetoreception is one of the oldest known biological functions; it is found in bacteria, insects, fish, reptiles, birds, and mammals (Levitt et al., 2022b). In migratory birds, according to the most studied hypothesis, it relies on retinal proteins, the cryptochromes, whose response to the magnetic field involves radical pairs that are sensitive to very weak fields.

4.2 Birds Near Mobile Phone Antennas

In Valladolid (Spain), Alfonso Balmori monitored sixty white stork nests in 2003: the thirty nests located within 200 meters (about 650 feet) of an antenna produced 0.86 fledglings per nest, compared with 1.6 for the thirty nests located more than 300 meters (about 1,000 feet) away ($P = 0.001$), and twelve of the former (40%) produced none, compared with a single one of the latter (3.3%); the mean field measured near the nests was 2.36 V/m, compared with 0.53 V/m (Balmori, 2005). The author specifies that the measurements were taken near the nests, which were inaccessible, and that field conditions do not allow all variables to be controlled.

The same author counted house sparrows at thirty points in the city, about once a month from October 2002 to May 2006. Density decreases as the field increases ($R = -0.87$; $P = 0.0001$); in a square where a picocell was installed from January to March 2005, the number of sparrows dropped during those three months, and they became abundant again after it was removed (Balmori and Hallberg, 2007). In Flanders, at 150 points in six neighborhoods, the number of breeding male house sparrows was likewise inversely related to the electric field in the 900 and 1,800 MHz bands (Everaert and Bauwens, 2007).

These studies have been criticized. In a report prepared for Brussels Environment, Verschaeve and Bervoets consider that the measurements, made with a directional antenna or not at the nest, do not correctly reflect exposure, and that confounding factors cannot be ruled out (Verschaeve and Bervoets, 2012). The German Federal Office for Radiation Protection points out that a correlation does not establish a causal link (Pophof et al., 2023). In India, a field study found no effect of radiation on habitat use by sparrows (Nath et al., 2022), a conclusion disputed by Balmori and Balmori-de la Puente in light of the study's own data (Balmori and Balmori-de la Puente, 2024). To our knowledge, no study has repeated the stork protocol while measuring exposure at the nest.

The U.S. Department of the Interior wrote in 2014: “There is a growing level of anecdotal evidence linking effects of non-thermal, non-ionizing electromagnetic radiation from communication towers on nesting and roosting wild birds and other wildlife in the U.S.” (U.S. Department of the Interior, 2014). The same letter stated: “To date, no independent, third-party field studies have been conducted in North America on impacts of tower electromagnetic radiation on migratory birds” (U.S. Department of the Interior, 2014); the FCC restates its substance in its 2026 consultation (FCC, 2026).

4.3 Amphibians

In an experiment conducted 140 meters (about 460 feet) from four base stations, seventy common frog tadpoles placed in an exposed tank (1.8 to 3.5 V/m) showed a mortality of 90%, asynchronous growth, and poorly coordinated movements, compared with a mortality of 4.2% for the seventy tadpoles in an identical tank placed inside a Faraday cage (Balmori, 2010). The experiment includes only one tank per condition and no statistical test, and the field was not measured inside the cage; Verschaeve and Bervoets consider it “subject to severe criticism” for the lack of valid dosimetry (Verschaeve and Bervoets, 2012). To our knowledge, it has never been repeated. As early as 2006, Balmori noted that the ubiquity of radiofrequency radiation makes it difficult to establish an unexposed control group (Balmori, 2006).

4.4 Insects

The simulation already cited (Thielens et al., 2018) shows that the exposure of insects would increase with the shift to higher frequencies. Beyond that, the data are debated: the reviews that attribute to radiofrequency radiation a role in insect decline are disputed by the German Federal Office for Radiation Protection, which concludes that mobile telephony cannot be considered a major cause of it; the European EKLIPSE project identifies, among the frequent weaknesses of the studies, the absence of blinding, of appropriate controls, and of exposure characterization, and

considers most reviews to be one-sided (Malkemper et al., 2018). The two positions agree on one point: well-designed field studies are lacking.

4.5 Ticks

A Slovak and Polish team has been observing how ticks react to radiofrequency radiation since 2017. Its experiments take place in an anechoic chamber, shielded from outside fields, in setups that give the ticks a choice between an exposed area and a shielded area. Exposed to 900 MHz, the GSM mobile telephony frequency, *Dermacentor reticulatus* ticks gathered in the exposed area; at 5,000 MHz, they fled to the shielded area (Vargová et al., 2018). Among 300 adult *Ixodes ricinus* ticks, the main vector of Lyme disease in Europe, exposed to 900 MHz, the ticks were attracted to the irradiated area, and the effect was significantly stronger in those infected with *Rickettsia*, the bacteria of spotted fevers; the authors infer that pathogens can alter the ticks' response to environmental stimuli (Frątczak et al., 2020).

A replication on 1,200 ticks of four species, exposed for 24 hours to 900 MHz at 40 V/m, found the same preference in both sexes of *Ixodes ricinus*—95 females and 89 males out of 150 in the exposed area—and in the males of both *Dermacentor* species, but not in their females nor in *Haemaphysalis inermis*; no species fled the exposed area (Bañas et al., 2023). The results do not all point the same way: at 0.6 V/m, *Ixodes ricinus* females showed no preference; in an open arena, near a mobile phone during a call, they did, however, travel farther and spend more time in the exposed part, from 50.5% to 66.7% of the time depending on the period (Vargová et al., 2022). The authors attribute these discrepancies, without being able to settle the matter, to the parameters of the radiation used (Bañas et al., 2023). This work is funded by Slovak public research agencies; Levitt, Lai, and Manville report it in their review (Levitt et al., 2022b).

The stakes go beyond animal behavior. The authors ask whether man-made electromagnetic fields may influence the activity of *Ixodes ricinus* and contribute to the changes in the distribution of the tick and its pathogens observed in Europe and elsewhere (Frątczak et al., 2020); in their view, their results could help assess the risk of tick-borne diseases and serve preventive medicine (Vargová et al., 2018). The field is already raising the question. In Alsace, Nathalie Boulanger, a medical entomologist at the University of Strasbourg, cites the Murbach valley—a white zone where we measured no mobile telephony waves in August 2026—among the places where more than 20% of ticks are reportedly infected with the Lyme disease bacterium (Dernières Nouvelles d'Alsace, 2026). She does not herself link this elevated rate to the absence of waves from the mobile telephone network, and laboratory results are not enough to explain this phenomenon. These experiments were conducted in the laboratory, on European species; to our knowledge, no field study has measured the distribution of ticks around antennas, and *Ixodes scapularis*, the vector of Lyme disease in the United States, has not been tested. Document 9 (Section 5) addresses Lyme disease in the electro-hypersensitive.

4.6 Trees and Plants

In Bamberg and Hallstadt (Germany), a study conducted over nine years across two cities examined 120 trees, with 144 measurement points between 0.047 and 2.53 V/m, that is, values far below the

limits. The values measured were significantly higher on the damaged side, facing the antenna, than on the opposite side; the thirty trees selected in areas below 50 $\mu\text{W}/\text{m}^2$, with no line of sight to an antenna, showed no damage (Waldmann-Selsam et al., 2016). The German Federal Office for Radiation Protection considers that, because of the nonrandom selection of the trees, these observations alone do not allow a scientific conclusion (Pophof et al., 2023); the 2023 review conducted for the Brussels-Capital Region includes the study without any particular methodological reservation (according to our files).

In the laboratory, plants respond to radiofrequency radiation through identified mechanisms. A review reports a 30% drop in ATP, the molecule that carries the cell's energy, thirty minutes after a ten-minute exposure at 900 MHz and 5 V/m; gene responses are strongly reduced when calcium is neutralized, which makes calcium a second messenger of the signal; an exposure limited to a single leaf triggers a response in unexposed leaves (Vian et al., 2016). The German Federal Office for Radiation Protection acknowledges that plants react in the laboratory to low-intensity radiofrequency radiation, while noting the lack of sufficient field studies (Pophof et al., 2023). Of 113 studies identified by a systematic review, effects were found in 65%, that is, in about half of the animal studies and three-quarters of the plant studies, according to the count given by Levitt et al. (Cucurachi et al., 2013; Levitt et al., 2022b).

4.7 Aquatic Environments

The studies mainly concern the static and extremely low-frequency (ELF) fields of submarine cables. In a search conducted on August 19, 2026, we found no study on the exposure of freshwater organisms to radiofrequency radiation, which documents the state of research, not the absence of effect.

5. The Sky

The aerosphere, from ground level up to several kilometers (a few miles) in altitude, is the habitat of birds, bats, and flying insects; Levitt, Lai, and Manville propose recognizing it as a habitat in its own right, on a par with water or soil (Levitt et al., 2022c, 2025). It is now continuously crossed by emissions from satellite constellations. The Government Accountability Office (GAO), the audit body of the U.S. Congress, recommended in 2022 that the FCC reexamine the 1986 categorical exclusion that generally exempts satellites from environmental review, noting light pollution, interference with radio astronomy, and the possible effects of atmospheric reentries (GAO, 2022). In addition, second-generation Starlink satellites emit, outside their communication bands, unintended radio radiation up to 32 times more intense than that of the previous generation (Bassa et al., 2024; Document 5, Section 3.5). This radiation reaches every location, including radio quiet zones and protected natural areas on the ground.

6. Institutional Positions

In the United States. On February 7, 2014, the Department of the Interior wrote to the National Telecommunications and Information Administration that the FCC standards “continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today” (U.S. Department of the Interior, 2014). On August 13, 2021, the U.S. Court of Appeals for the District of Columbia Circuit held that the FCC’s decision to retain its limits was arbitrary, in particular for “its complete failure to respond to comments concerning environmental harm caused by RF radiation,” and remanded the matter to the agency for an explanation (D.C. Circuit, 2021). Five years later, on September 17, 2026, the FCC opened a consultation on this remand (public notice DA 26-997, published in the Federal Register on September 22); in it, the agency asks what probative weight to give the Department of the Interior letter and cites the position of the Australian radiation protection agency, according to which good-quality studies show no effect of radio waves on plants and animals (FCC, 2026).

In Europe. The report of the German Federal Office for Radiation Protection, based on a workshop held in 2019, concludes that there is no solid evidence of harmful effects of low-intensity radiofrequency radiation on animals and plants under realistic conditions, while noting the scarcity of field studies of sufficient quality and recommending further research (Pophof et al., 2023). For the Brussels-Capital Region, the 2012 review considered it unlikely, in light of laboratory studies, that such weak fields could have the effects reported on storks (Verschaeve and Bervoets, 2012); its December 2023 update considers that the regional standard, raised to 14.57 V/m outdoors, does not significantly compromise the integrity of Natura 2000 sites, while acknowledging a risk of displacement of disturbed species and recommending that the review be renewed every six to ten years (according to our files). This standard had been set at 3 V/m by the 2007 ordinance, which was in force in 2009.

7. Discussion

Question 14 asks what evidence exists. The evidence is of two kinds. Controlled experiments on the orientation of birds and bats, those on the behavior of ticks, and laboratory work on plants establish that living organisms respond to artificial radiation far below the limits, through nonthermal mechanisms. Field observations near mobile phone antennas—storks, sparrows, tadpoles, trees—point in the same direction, but their methodology is debated. The debate bears less on the results than on the quality of exposure measurement, and it has not been settled by new studies: to our knowledge, the institutions that criticize these observations have not repeated them with a better protocol. The Department of the Interior noted in 2014 that no independent field study existed in North America; the absence of field studies is a choice of research priorities, not proof of safety.

The experiments on ticks add a health dimension. If radiofrequency radiation alters the activity or distribution of vectors, the effect on nonhuman life comes back to human beings through the diseases these vectors transmit; this is the question the authors themselves raise (Section 4.5), and, to our knowledge, no field study has yet settled it.

These data have implications beyond wildlife. Animals and trees do not know that an antenna is nearby; as Balmori writes, studies on animals and trees are of special importance because they “cannot be aware of their proximity and to which psychosomatic effects can never be attributed” (Balmori, 2022). The nocebo objection, raised against the electro-hypersensitive, cannot be raised against them. The most convincing experiments are, moreover, those that removed the exposure: the shielding of the Oldenburg huts, the Faraday cage of the tadpoles, the removal of the Valladolid picocell.

Finally, wild animals cannot move away from the sources, and trees even less so. Their protection can only come from reducing exposure at the source and from preserving spaces that are free of it. White zones, which coverage policy is eliminating (Documents 1 and 5), are the last electromagnetically intact habitats: the more of them there are, the better living beings are protected.

8. Limitations

A large share of the field observations comes from a single author and a single city; they have not been replicated. Several studies are cited from their abstracts or from a press release, as indicated in Section 2. The robin study concerns frequencies lower than those of mobile telephony, and the bat study stops at 300 MHz. Many of the studies on insects and plants are laboratory work; all of those on ticks are laboratory work, come from a single research group, and concern European species. The 2023 Brussels update and the survey of aquatic studies are reported from our files.

9. Recommendations (Question 14)

1. Establish, through bodies independent of the industry, exposure limits intended for fauna and flora, taking into account the near field of antennas, where birds nest and insects fly.
2. Subject antennas, small cells, and satellite constellations to prior environmental review, and end the categorical exclusion that exempts satellites from it.
3. Fund independent field studies based on removing the exposure—shielding, switching off an antenna, before and after—which have so far yielded the clearest results.
4. Preserve the white zones that remain and re-create others, for living beings as for the electro-hypersensitive; exclude protected natural areas from any deployment, whether terrestrial or satellite.
5. Reduce exposure at the source throughout the territory, in accordance with the ALARA principle (Council of Europe, 2011, § 8.4.3), since living beings cannot move away from transmitters.
6. In assessing effects on human health, take into account the observations made on animals and plants, to which no psychosomatic effect can be attributed.
7. Commission studies, in the field and on species present in the United States, including *Ixodes scapularis*, of the effect of radiofrequency radiation on the activity and distribution of ticks, and

take them into account in federal work on the diseases ticks transmit.

Glossary

Term	Meaning
5G, 6G	Fifth and sixth generations of mobile telephone networks. 6G has not yet been deployed.
ALARA	<i>As low as reasonably achievable</i> : the principle that an exposure should be kept as low as reasonably possible.
Anechoic chamber	A room with absorbent walls that blocks outside electromagnetic fields and suppresses reflections, used for tests under controlled radiation.
ATP	Adenosine triphosphate: the molecule that carries energy within the cell.
Base station	A mobile telephone installation comprising one or more base station antennas.
Categorical exclusion	In U.S. environmental law, a category of actions exempted from environmental review.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
Cryptochrome	A light-sensitive protein, found notably in the retina of birds, involved in the perception of the Earth's magnetic field.
EKLIPSE	A coordination project funded by the European Union, tasked with informing public decisions on biodiversity.
Electro-hypersensitivity	The highest degree of electrosensitivity, a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; we regard it as a syndrome, not a disease (see Document 4, Section 3.1).
Faraday cage	A conductive enclosure that blocks external electromagnetic fields.
FCC	Federal Communications Commission: U.S. federal agency that regulates telecommunications and sets the limits for exposure to radiofrequency radiation.
GAO	Government Accountability Office: the audit and evaluation body of the U.S. Congress.
German Federal Office for Radiation Protection	Bundesamt für Strahlenschutz (BfS): German public agency responsible for protection against radiation.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
Lyme disease	An infection caused by bacteria of the <i>Borrelia burgdorferi</i> group, transmitted by ticks of the genus <i>Ixodes</i> ; also called Lyme borreliosis.
Magnetoreception	The ability of an organism to perceive the Earth's magnetic field and to use it for orientation.

Term	Meaning
Natura 2000	European network of natural sites protected under the Birds and Habitats Directives.
Near field, far field	The near field is the zone very close to an antenna, where the radiation has not yet stabilized and where exposure is poorly described by the usual measurements; the far field is the zone beyond it.
Nocebo effect	The onset of symptoms attributed to the expectation of a harmful effect, and not to the agent itself.
Picocell	A very short-range mobile phone antenna, installed in cities on street furniture or on a building facade.
Radical pair	A pair of molecules each carrying an unpaired electron, whose evolution can be influenced by very weak magnetic fields.
Radio quiet zone	Area where radio emissions are restricted by law to protect radio astronomy observations, as around Green Bank (United States).
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Rickettsia	A bacterium of the genus <i>Rickettsia</i> , transmitted notably by ticks, which causes spotted fevers.
Specific absorption rate (SAR)	Power absorbed per unit mass of tissue, in watts per kilogram (W/kg).
Tick	A parasitic arachnid that feeds on the blood of vertebrates and transmits many pathogens; <i>Ixodes ricinus</i> in Europe and <i>Ixodes scapularis</i> in the eastern United States transmit Lyme disease.
U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit)	U.S. federal court that hears, among other matters, challenges to the decisions of federal agencies, including the FCC.
U.S. Department of the Interior	U.S. federal executive department responsible, among other things, for wildlife, through its Fish and Wildlife Service.
V/m, $\mu\text{W}/\text{m}^2$, mW/cm^2	Units of field strength: the volt per meter measures the electric field; the microwatt per square meter and the milliwatt per square centimeter measure power density.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 7 — Supplementary Information: Research Gaps, Research Coordination, Total Exposure, and Propaganda

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 16; 17; 18.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

This document answers three summary questions. The first concerns the highest-priority research gaps. Documents 2 to 6 identified several, which we group into six priorities: measuring the real and total exposure of individuals; studying the non-thermal and long-term effects of current signals; giving electro-hypersensitivity tools for diagnosis and follow-up; conducting field studies on fauna and flora; assessing every new technology before its deployment; and guaranteeing independent funding. The main U.S. federal program of animal studies on radiofrequency radiation has ended, and the signals it tested no longer represent the technologies in service. The second concerns the coordination of research among federal agencies: device testing, biomedical research, and surveillance make sense only when brought together in a common program, independent of industry. The third invites any additional information. We retain two points. The first governs all the others: emissions add up. An individual's exposure, particularly at night, depends not only on antennas but also on Wi-Fi left on, the phone placed near the head, the cordless phone base, connected devices, and the meter. Acting on antennas without acting on these sources, or the reverse, leaves part of the exposure untouched. To this end, we bring together the reference values in force or proposed, from 61 V/m to 0.006 V/m, with their status. The second concerns the way information on radio waves is produced and transmitted: experts linked to ICNIRP in the World Health Organization's assessment, studies whose results follow their funding, information files handed to mayors by operators, a guide for physicians produced with industry support, and a press that announces a harmlessness the agency it cites does not assert. What we call propaganda lies less in falsehood than in selection and omission. The document sets out eight recommendations.

1. Purpose

Question 16 of the Request for Information asks which research gaps are the highest priority for the federal health agencies to address. Question 17 asks how these agencies can better coordinate research. Question 18 invites the identification of any other scientific evidence, technical information, or recommendations to be considered. The gaps specific to the medical profession are detailed in Document 8; those concerning measurement, sensitive populations, technologies, and the environment, in Documents 3 to 6, to which we refer the reader.

2. Methods and Sources

This document draws on the findings of Documents 1 to 6 and 8, to which it refers, and adds sources of three kinds: web pages and fact sheets of public bodies (the U.S. National Toxicology Program, the Swiss Federal Office of Public Health), consulted directly; recommendations and precautionary values published by European organizations and by the Council of Europe; and private building biology (Baubiologie) standards, whose position is stated. The guideline of the European Academy for Environmental Medicine (EUROPAEM) was consulted in its French translation. The 2023 opinion of Anses (French Agency for Food, Environmental and Occupational Health & Safety) and the 2023 press release of the French National Frequency Agency (ANFR) were read directly; Council of Europe Resolution 1815, in its adopted text. The French law of February 9, 2015, is cited from a presentation of its content; its text is examined in Document 3. The sources in Section 6 are public documents, whose position is stated: the 2025 press article and the 2021 information file were analyzed; the GSMA report was read in full on October 15, 2026; the 2023 World Health Organization public notice, the GHUP guide, and the 2025 Anses press release were consulted directly; the interview published by Infosperber, in its German version; the review by [Huss et al. \(2007\)](#), from its abstract, and its update ([van Nierop et al., 2010](#)), in its full text; the training offered by the FMK, the presentation of the Informationszentrum Mobilfunk, and the Wikipedia article, from our files. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. Priority Research Gaps (Question 16)

3.1 Measuring Real and Total Exposure

What an individual actually receives is not known. Measurement protocols verify compliance with the limits at one point, at one moment, with personal devices switched off (Document 3, Sections 3 and 4). No regulatory protocol measures an individual's cumulative exposure over twenty-four hours, inside the home, domestic sources included; the body-worn exposimeters used in research studies are not employed routinely. Beamforming antennas, under which compliance with the reference level no longer guarantees compliance with the basic restriction, escape current methods (Document 3, Section 4.3). The low frequencies of the power line communication used by smart meters remain outside the protocols (Documents 3 and 5).

3.2 Studying the Non-Thermal and Long-Term Effects of Current Signals

The limits are based on tissue heating (Document 2). Effects at lower levels, documented in animals and plants (Document 6) and reported by the electro-hypersensitive (Documents 4 and 8), have not been the subject of a public program commensurate with the population's exposure. In the United States, the National Toxicology Program concluded in 2018 that there was “Clear evidence of an association with tumors in the hearts of male rats”; it now states: “NIEHS has no further plans to conduct additional RFR exposure studies at this time,” on the grounds that the follow-up work, conducted with a small-scale exposure system, proved “technically challenging and more resource intensive than expected,” and it specifies that its exposure system does not represent recent technologies, 4G or 5G ([National Toxicology Program, 2026](#)). In France, Anses recommends studying the 1 kHz to 30 MHz range, that of smart meters, whereas the additional tax on the flat-rate tax on network companies (IFER) that funded the annual “Radiofrequencies and Health” research program was abolished in 2019 ([Anses, 2023](#), pp. 22–23; Document 5, Section 3.9). Real-world signals—modulated, pulsed, multiple, beam-steered—and the lifetime exposure of children remain the main unknowns.

3.3 Giving Electro-Hypersensitivity Tools for Diagnosis and Follow-Up

Electro-hypersensitivity has no diagnostic code of its own, no registry, and no validated criteria (Document 4). Provocation studies, on which the negative conclusions rest, test short exposures and immediate perception, whereas the electro-hypersensitive describe delayed and cumulative reactions (Document 8). The search for biological markers, cohort follow-up, and protocols based on the removal of exposure, rather than on its conscious detection, are priorities.

3.4 Conducting Field Studies on Fauna and Flora

The institutions that conclude there is no evidence of harmful effects themselves note the scarcity of high-quality field studies; no limit exists for non-human life (Document 6). The most probative study designs have been those that remove exposure: shielding, switching off an antenna, before-and-after comparison.

3.5 Assessing Every New Technology Before Its Deployment

The framework for 6G is being set before any health assessment of the bands it will use; smart meters were deployed while there was “virtually no scientific literature” on their specific effects ([Anses, 2023](#), p. 19); to our knowledge, no health study has been devoted to satellite constellations, which are as a general rule exempt from environmental review (Documents 5 and 6). Research should precede deployment, not follow it.

3.6 Guaranteeing Independent Funding

The authors of the reference studies often belong to networks linked to ICNIRP or to industry, and their position is stated in our documents (Documents 2 and 3). Stable public funding and governance with no ties to operators and manufacturers are the condition for the credibility of the results, in either direction.

4. Research Coordination (Question 17)

Question 17 asks how the federal health agencies can improve the coordination of research, and what roles the Food and Drug Administration (FDA), the National Institutes of Health (NIH), and the Centers for Disease Control and Prevention (CDC) can play in it. We answer on the basis of European experience, without claiming to know the internal workings of these agencies.

FDA (17a). Exposure depends first of all on the devices worn in contact with the body. In France, it was the post-market testing of the specific absorption rate (SAR) of devices sampled from retail outlets, measured in contact with the body, that led in September 2023 to the suspension of sales of a widely distributed phone model (ANFR, 2023; Document 3, Section 3.5). An agency responsible for products could in the same way test the phones, wearable devices, and wireless medical devices on the market, publish the results, and require settings that reduce exposure by default.

NIH (17b). The program of animal studies on radiofrequency radiation has ended, and the signals it tested no longer represent the networks in service (Section 3.2). It falls to biomedical research to resume experimental and mechanistic studies on current signals, to build cohorts, children included, and to fund studies on electro-hypersensitivity based on the removal of exposure (Document 8).

CDC (17c). Only what is named can be monitored: in the absence of a diagnostic code, no registry of electro-hypersensitivity exists (Document 4, Section 5). A public health agency could organize the collection of symptoms attributed to exposure, the follow-up of case clusters, and the cross-referencing of health data with exposure data, including antenna maps and measurements.

Coordination. The three roles make sense only when brought together in a common program, with a shared research agenda, public data, and governance with no ties to industry. This program should work with the authority that sets the limits, the Federal Communications Commission (FCC), which in September 2026 opened its own consultation, parallel to that of HHS (Document 6, Section 6), and with the agencies responsible for wildlife (Document 6).

5. Electromog: The Sum of All Sources (Question 18)

5.1 An Exposure That Adds Up

The term electromog refers to all the artificial electromagnetic fields to which a human being is exposed at a given moment. These fields add up: the neighborhood base station antenna and its small cells, satellites, the neighbors' Wi-Fi and one's own, the cordless phone base, the mobile phone, Bluetooth, connected devices, the smart meter and the power line communication signal it injects into the wiring, including in homes that have no smart meter (Documents 1, 3, and 5). The user's own phone often dominates the dose received by the head, and the weaker the network, the more it emits (Document 3, Section 4.1). Domestic sources are also those closest to the body, and they remain so at night.

A phone that is switched on stays connected to the network and transmits periodically, even when no call is in progress. The base of an ordinary DECT cordless phone emits even when idle; according to the Swiss Federal Office of Public Health, “In standby mode, without a phone call, the base station emits a short pulse every 10 ms,” whereas “In Eco mode, the base station does not radiate at all”; it recommends activating this mode and keeping bases without ECO mode at least 50 cm away from places of rest or work occupied for long periods (FOPH, 2016).

A practical consequence follows, which is also our main supplementary recommendation. Focusing on antennas alone makes no sense if Wi-Fi stays on in homes, if the phone sleeps next to the head, and if the DECT base emits from the nightstand; and protecting one’s home is not enough if the nearby antenna, the small cell on the street, or the satellite exposes the entire territory. Both actions stem from the same principle: reducing exposure at the source, whether public or domestic.

5.2 What the Texts Already Recognize

France has accepted the principle for the youngest children. The law of February 9, 2015, prohibits Wi-Fi in spaces dedicated to the care, rest, and activities of children under three years of age, and requires that it be switched off in primary school classrooms when it is not being used for digital teaching activities (Maire-info, 2015). Council of Europe Resolution 1815 recommended, as early as 2011, giving preference to wired connections for children, particularly at school (Council of Europe, 2011, § 8.3.2). The Swiss Federal Office of Public Health recommends the ECO mode of cordless phones (Section 5.1). These measures concern domestic and school sources: they show that reducing exposure also involves the interior of buildings.

5.3 Reference Values

The table below brings together the values in force or proposed for radiofrequency radiation, with their status. Power densities are converted to electric field strength using the relation $S = E^2/377$; dividing the field by ten corresponds to dividing the power density by one hundred.

Reference	Value	Status
1999 European Recommendation, adopted in France	36 to 61 V/m depending on frequency for mobile telephony (61 V/m above 2 GHz)	Regulatory limits in several countries, including France; based on heating (Document 2)
Switzerland, Ordinance on Protection against Non-Ionising Radiation	4 to 6 V/m per installation, in places of sensitive use; elsewhere, ICNIRP values	Installation limit values, as a precaution (Document 2)
Council of Europe, Resolution 1815 (2011)	0.6 V/m, then 0.2 V/m in the medium term, indoors, for long-term exposure	Recommendation to States (Council of Europe, 2011, § 8.2.1)
EUROPAEM (2016), mobile telephony and DECT, peak values	100 $\mu\text{W}/\text{m}^2$ during the day (0.19 V/m); 10 $\mu\text{W}/\text{m}^2$ at night (0.06 V/m); 1 $\mu\text{W}/\text{m}^2$ for sensitive populations (0.02 V/m)	Precautionary guideline values for places occupied more than twenty hours per week (Belyaev et al., 2016)

Reference	Value	Status
EUROPAEM (2016), Wi-Fi, peak values	10 $\mu\text{W}/\text{m}^2$ during the day (0.06 V/m); 1 $\mu\text{W}/\text{m}^2$ at night (0.02 V/m); 0.1 $\mu\text{W}/\text{m}^2$ for sensitive populations (0.006 V/m)	Same as above
Building biology, sleeping areas, peak values, per source	No concern below 0.1 $\mu\text{W}/\text{m}^2$ (0.006 V/m); slight concern up to 10 $\mu\text{W}/\text{m}^2$ (0.06 V/m); severe concern up to 1,000 $\mu\text{W}/\text{m}^2$ (0.6 V/m); extreme concern above	Guideline values of a private German standard, applicable to each source taken individually, based on experience and the precautionary principle (IBN, 2008)

Between the regulatory limit of 61 V/m and the value of 0.06 V/m, which is the EUROPAEM nighttime value for mobile telephony and DECT and the threshold of severe concern in building biology, the electric field is divided by a thousand, and the power density by a million. It is within this interval that the controversy lies: regulatory limits protect against heating; precautionary values target effects reported at far lower levels, notably by the electro-hypersensitive.

6. Expertise, Communication, and Propaganda (Question 18)

Question 18 also invites the identification of any other useful information. The federal agencies will receive many comments that repeat the same reassuring conclusions, attributed to the World Health Organization, to ICNIRP, or to national agencies. We consider it useful to show, on the basis of public documents, how these conclusions are produced and transmitted. By propaganda we mean here communication that presents as settled a question that its own sources regard as open, or that conceals the interest of the party disseminating it.

6.1 The Reference Assessment

The World Health Organization (WHO) is completing a monograph on radiofrequency fields in its *Environmental Health Criteria* series. In the public notice presenting its task group, six of the twenty-one experts report, in their own biographies, a present or past link with ICNIRP; the notice states that the declared interests will be published later (WHO, 2023). The first author of the WHO-commissioned review on cancer in human beings sits on the ICNIRP Main Commission (Document 2, Section 4.4). The toxicologist who led the review on cancer in animals, which concludes with a high level of certainty that cancers increase in exposed animals (Document 2, Section 4.2), stated in January 2026: “Research is very political, and we are constantly confronted with the attitude that there must not be any health risks” (Sigg, 2026). In October 2026, before the monograph was published, the global association of mobile network operators wrote: “Countries can use this opportunity to harmonize with international radio-frequency electromagnetic field (RF-EMF) policy good practice,” that is, with the ICNIRP limits (GSMA, 2026).

6.2 Funding and Results

A systematic review of 59 experimental studies on the effects of mobile phones compared their results according to their funding. Studies funded exclusively by industry were the least likely to

report a statistically significant result: the odds ratio was 0.11 (95% confidence interval: 0.02 to 0.78) compared with studies funded by public agencies or foundations, with no notable change after adjustment for the number of outcomes reported and for study quality. The authors conclude: “The interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship into account” (Huss et al., 2007).

The same authors updated their review in 2010, covering 75 studies published from 2005 to 2009: “Previous findings were confirmed: industry-sponsored studies were least likely to report results suggesting effects” (van Nierop et al., 2010). Across all 134 studies from 1995 to 2009, adjusted for year of publication, the odds ratio for industry-funded studies was 0.20 (95% confidence interval: 0.05 to 0.85); for the 2005–2009 period alone, it was 0.33, without being statistically significant. None of the industry-funded studies, nor any of those with an author affiliated with the telecommunications industry, declared a conflict of interest. Studies that did not report their funding more often reported effects, and the proportion of studies reporting an effect fell from 63% to 36%, regardless of funding.

6.3 Information for Mayors and Physicians

In France, an operator planning an antenna gives the mayor a municipal information file (Document 3, Section 5.1). In the file one operator prepared in February 2021 for an antenna in the Moselle department, five of the forty pages, under the heading “Health opinions,” bring together excerpts from agencies in several countries, selected and translated by the operator, all of which conclude that there is no established risk below the ICNIRP limits; they immediately precede the operator’s commitments (Free Mobile, 2021). The mayor, who cannot oppose the project on health grounds (Document 2, Section 3.3), thus receives health information from the operator itself.

In Germany, the Society for Hygiene, Environmental Medicine and Preventive Medicine (GHUP) distributes to physicians a guide entitled *Was sage ich meinen Patienten?* (“What do I tell my patients?”), subtitled “Guide for dealing with patients who feel affected by mobile communications.” The guide, dated June 2020, bears the statement “With the kind support of the Forum Mobilkommunikation (FMK)” (GHUP, 2020); the FMK describes itself as “a voluntary interest group representing the Austrian mobile communications industry” (FMK, 2026). In 2014, the FMK offered all Austrian physicians an online training course from the Informationszentrum Mobilfunk, certified for two continuing medical education credits (FMK, 2014); this platform is supported by four German operators, Telekom Deutschland, Telefónica Germany, Vodafone, and 1&1 (IZMF, 2026).

6.4 The Press and the Encyclopedia

On December 3, 2025, a French national weekly presented an Anses report released a week earlier as follows: “A new Anses report confirms the harmlessness of mobile phone waves” (Seznec, 2025). Anses concluded that no causal link had been established between exposure to radio waves and the onset of cancers; it maintained “its recommendations of caution, in particular for children,” and did not rule out “that future work may bring new evidence” (Anses, 2025). The word “harmlessness” (*innocuité*) does not appear in its press release. The article itself quotes these two reservations, as phrases that would sustain unfounded fears. Built on an interview with a single expert, it presents

electro-hypersensitivity as “an epidemic of beliefs” and likens the International Agency for Research on Cancer’s classification of radiofrequency radiation to that of coffee. Online, the French-language Wikipedia article on electromagnetic sensitivity cites, in its section on research results, no scientific publication later than 2012 ([Wikipedia, 2026](#)); more recent criticism of the method of provocation studies (Document 8, Section 4) does not appear in it.

6.5 What These Examples Have in Common

None of these documents contains a false figure. Each one selects: concurring opinions rather than reservations, the conclusion rather than its limitations, one expert rather than the debate, older studies rather than recent ones. The propaganda we describe lies less in falsehood than in selection and omission. It has a direct consequence for the electro-hypersensitive: the physician who has read the guide, the mayor who has read the file, and the reader who has read the headline conclude that the question is closed, and that the symptoms described to them have no external cause.

7. Discussion

The research gaps and the addition of sources stem from the same cause: exposure is assessed source by source, against limits designed for heating, whereas the body receives it as a whole. A health policy confined to antennas would leave the domestic share of exposure untouched; a policy that left each individual to deal with their own devices would leave untouched the exposure imposed by infrastructure. The priority research is therefore research that measures the total exposure of individuals and studies its long-term effects, and public information must cover all sources at once.

The end of the U.S. animal study program shows the limits of research that follows technologies instead of preceding them: by the time an exposure system has been designed, the signals studied are no longer those of the network. An assessment conducted before deployment, not after, is the only one that can protect.

The propaganda described in Section 6 makes these gaps lasting: as long as the information reaching physicians, elected officials, and the public presents the question as closed, the research described in Section 3 does not appear necessary.

8. Limitations

The ranking of priorities is our own; it relies on the findings of Documents 2 to 6 and does not exhaust the possible gaps. The EUROPAEM and building biology precautionary values are not demonstrated safety thresholds: they rest on clinical experience and on the precautionary principle. The building biology standard cited is the 2008 version of its guideline values, the only one read for this document. The 2015 law is cited from a presentation of its content. The examples in Section 6 are documented cases, not a survey. The toxicologist’s testimony is a statement to the press: it describes pressures; it does not prove them. The review by [Huss et al. \(2007\)](#) and its update

(van Nierop et al., 2010) cover studies published up to 2009; the update analyzes only the abstracts of the articles.

9. Recommendations (Questions 16, 17, and 18)

1. Make the measurement of the real and total exposure of individuals, over twenty-four hours and inside homes, domestic sources included, the first research priority.
2. Re-establish a public program of studies on non-thermal and long-term effects, covering the signals actually in service and the exposure of children, funded and governed with no ties to industry.
3. Conduct every health and environmental assessment of a new technology before its deployment.
4. Inform the public about all sources, public and domestic: Wi-Fi switched off when not in use and at night, wired connections, the phone kept away from the bed and switched off at night, corded phones or, failing that, cordless phones in ECO mode.
5. Require manufacturers and internet service providers to provide settings that reduce exposure by default: Wi-Fi that can be easily disabled and scheduled, wired ports, ECO mode activated out of the box on cordless phones.
6. Bring the FDA, the NIH, and the CDC together in a common research program—testing of devices on the market, experimental studies and cohorts, symptom surveillance—with public data, governance with no ties to industry, and coordination with the FCC.
7. Adopt, for sleeping areas and places of prolonged occupancy, precautionary values on the order of those of the Council of Europe, EUROPAEM, and building biology; reduce exposure at the source accordingly throughout the territory; and preserve the white zones that remain, while re-creating others.
8. Require disclosure of the funding and conflicts of interest behind all health information on radio waves intended for the public, elected officials, and physicians; exclude all industry funding from continuing medical education on this subject; and examine the WHO monograph in light of its authors' declared interests, whose publication has been announced, and of the method by which its experts were selected.

Glossary

Term	Meaning
4G, 5G, 6G	Fourth, fifth, and sixth generations of mobile telephone networks. 6G has not yet been deployed.
ANFR	Agence nationale des fréquences (French National Frequency Agency): French public body responsible for managing radio frequencies and monitoring public exposure, including the SAR of phones sold in France.

Term	Meaning
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
Beamforming	Technique by which an antenna concentrates its signal in the direction of the user instead of emitting it uniformly.
Bluetooth	Short-range radio link between devices, around 2.4 GHz.
Building biology (Baubiologie)	Discipline born in Germany, devoted to the effects of housing on health; its guideline values are published by the Baubiologie Maes office and the Institut für Baubiologie + Ökologie (now Institut für Baubiologie + Nachhaltigkeit), which are private bodies.
CDC	Centers for Disease Control and Prevention: U.S. federal agency for public health and epidemiological surveillance.
Continuing medical education	Physicians' obligation to undergo training throughout their practice, validated by credits awarded to accredited courses.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
ECO mode	Mode of DECT cordless phones in which the base stops transmitting, or transmits only very weakly, when no call is in progress.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
Electrosmog	All the artificial electromagnetic fields to which a human being is exposed at a given moment.
Environmental Health Criteria	Series of World Health Organization monographs devoted to assessing the health risks of an agent.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
FCC	Federal Communications Commission: U.S. federal agency that regulates telecommunications and sets the limits for exposure to radiofrequency radiation.
FDA	Food and Drug Administration: U.S. federal agency responsible, among other things, for radiation-emitting products.
Federal Office of Public Health (FOPH)	Bundesamt für Gesundheit (BAG): the Swiss federal public health authority.
FMK	Forum Mobilkommunikation: voluntary interest group representing the Austrian mobile communications industry.

Term	Meaning
GHUP	Gesellschaft für Hygiene, Umweltmedizin und Präventivmedizin: German medical society for hygiene, environmental medicine, and preventive medicine.
GSMA	Global association of mobile network operators.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
IARC	International Agency for Research on Cancer, an agency of the World Health Organization; in 2011 it classified radiofrequency radiation as “possibly carcinogenic to humans” (Group 2B).
IBN	Institut für Baubiologie + Ökologie, now Institut für Baubiologie + Nachhaltigkeit: private German building biology institute, on whose behalf the Baubiologie Maes office established the discipline's testing standard and guideline values.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
Informationszentrum Mobilfunk (IZMF)	German information platform on mobile communications, supported by four operators.
Municipal information file (dossier d'information mairie)	File that the operator gives the mayor before any planning application for an antenna, under the law of February 9, 2015.
NIEHS, National Toxicology Program	National Institute of Environmental Health Sciences, an institute of the U.S. National Institutes of Health; it hosts the National Toxicology Program, which conducted the animal studies on radiofrequency radiation published in 2018.
NIH	National Institutes of Health: the group of U.S. federal biomedical research institutes.
Odds ratio	Measure of association: a ratio below 1 indicates that an outcome is less frequent in one group than in the other.
Peak value	Maximum value of a signal over the duration of the measurement, as opposed to its average value.
Power line communication	Data transmission by superimposing a signal of a few tens of kilohertz on the electric current of the existing wiring.
Propaganda	In this document, communication that presents as settled a question that its own sources regard as open, or that conceals the interest of the party disseminating it.
Reference level, basic restriction	The basic restriction limits the energy absorbed in the body; the reference level limits the field measurable outside the body and is supposed to guarantee compliance with the former.
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
SAR	Specific absorption rate: power absorbed per unit mass of tissue, in watts per kilogram; it is used to verify the compliance of devices worn close to the body.

Term	Meaning
Small cell	Low-power, short-range antenna installed close to the ground, on street furniture or building facades, and connected to the operator's network like a base station; "small-area wireless access point" in European Union law (see Document 5, Section 4.1).
V/m, $\mu\text{W}/\text{m}^2$	Units of field intensity: the volt per meter measures the electric field, the microwatt per square meter the power density; $S = E^2/377$ converts one into the other.
WHO	World Health Organization.
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.
Wikipedia	Online encyclopedia written by volunteer contributors, most often anonymous.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 8 — The Medical Profession and Electro-Hypersensitivity: What Physicians See, What Studies Test, What Remains to Be Known

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Questions addressed: 4 (4h to 4m); 9 (information for health professionals); 10f; 16 (gaps in medical research).

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Disclaimer: the authors are not physicians. The medical elements presented here—tests, biological markers, exposure-reduction measures—are reported from published sources and existing guidelines, which are cited. They constitute neither medical advice, nor a prescription, nor a care protocol, and they do not replace the judgment of a health professional.

Abstract

Primary care physicians see patients who attribute their symptoms to electromagnetic fields. In Switzerland, as early as 2005, more than two-thirds of the general practitioners surveyed had seen such patients, and they judged the association plausible in more than half of the cases. In our experience, many others consult for the same symptoms without suspecting their cause; the attribution often comes years later (Section 3.2). The symptoms reported—sleep disorders, headaches, fatigue, cognitive problems (“brain fog”), tinnitus, palpitations—are considered real by the World Health Organization (WHO); no validated test currently makes it possible either to confirm or to rule out the diagnosis. Faced with them, two medical doctrines stand opposed. The first, that of the [WHO \(2005\)](#) and of the document prepared for French physicians at the end of 2023, focuses care on the symptoms, sets aside exposure reduction, and offers, where appropriate, cognitive behavioral therapy. The second, that of the Austrian Medical Association (2012) and of the European Academy for Environmental Medicine (2016), makes exposure reduction the main treatment. The first relies on provocation studies that test the perception of a brief exposure, not its effects; their own authors acknowledge their limitations, and two members of ICNIRP now consider there is little value in continuing them in the same form. Biological markers and a cellular

radiosensitivity have been described in electro-hypersensitive individuals, without independent replication. Between these doctrines, the patient wanders, and sometimes gives up.

This document also addresses information for health professionals; the reporting of adverse effects, which, to our knowledge, does not exist in a form suited to this exposure; and gaps in medical research. It sets out eight recommendations.

1. Purpose

Question 4 of the Request for Information is addressed to health professionals, researchers, and public health practitioners. It asks them to describe observations, from clinical practice, occupational settings, or research, that could reveal patterns of adverse effects reported in relation to radiofrequency exposure: types of effects (4h), onset (4i), characteristics of the individuals affected (4j), exposure patterns (4k), standardized assessment methods (4l), and recommendations for research and surveillance (4m). Question 9 asks what technical and exposure-related information should be communicated to, among others, health professionals; we answer for the latter, the other audiences being addressed in Documents 3, 7, and 9. Question 10f concerns the reporting of adverse effects; the other surveillance systems are addressed in Document 4. Question 16 concerns priority research gaps: Document 7 gives the overall picture, and this document details the medical aspect.

We do not claim to speak on behalf of physicians. We report what the medical literature, guidelines, and published surveys say about their observations, and what we ourselves have observed on the patients' side.

2. Methods and Sources

As the Request for Information asks, we specify the nature of our supporting evidence. The sources are of five kinds: peer-reviewed publications; medical guidelines; documents from agencies and administrations; court decisions; and observations by the authors, one of whom is electro-hypersensitive.

The following were analyzed: the review by [Rubin et al. \(2005\)](#); the articles by the ARTAC team from 2015, 2020, and 2024; the Inserm study ([Sonzogni et al., 2025](#)); the survey by [Leszczynski \(2025\)](#); the article by [Ashton \(2025\)](#); the ruling of the [Riom Court of Appeal \(2025\)](#); the guide “Et si c’était les ondes ?” [What if it were the waves?]; and the guidelines of the Austrian Medical Association, in German, and of EUROPAEM, in its 2016 French translation; only the English version of the latter is authoritative; the one passage quoted directly in this English version is from the original English text, and the others are paraphrased from the French translation. Only the abstract was read for [Huss and Rösli \(2006\)](#), [Huss et al. \(2007\)](#), [Schmiedchen et al. \(2019\)](#), [Pall \(2013\)](#), and the neurology publications on multiple sclerosis ([Thompson et al., 2018](#); [Solomon et al., 2016](#); [Kaisey et al., 2019](#); [Montalban et al., 2025](#)); the commentary by [Solomon and Brodersen \(2025\)](#) is cited from its title; the article by Dr. Boutbaoucht was reread in full, from the copy kept in our files; excerpts were read for

de Vocht and Rössli (2025). The WHO fact sheet was read in English and in French; the 2018 opinion of Anses (French Agency for Food, Environmental and Occupational Health & Safety) was reread, and its expert report is cited from our reading notes. The document of the French Society of Occupational Health, SFST (2023), was read with an automated reading tool, and the passages quoted were checked against the text of the PDF. The pages and documents of institutions (FDA, U.S. Access Board, Anses, Haute Autorité de santé (French National Authority for Health), ICNIRP, French Senate, Institute of Medicine, MTHR program), the patent cited, and the pages of the diagnose:EHS website were consulted in their original text. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. What Physicians See (Question 4)

3.1 Types of Effects Reported (4h)

The symptoms that patients attribute to electromagnetic fields are, first of all, nonspecific. In a telephone survey of 342 randomly selected Swiss general practitioners, sleep disorders, headaches, and fatigue were the most frequent symptoms at the most recent consultation of this kind (Huss and Rössli, 2006). The EUROPAEM guideline gives a broader list: sleep problems, fatigue, exhaustion, lack of energy, restlessness, heart palpitations, blood pressure problems, muscle and joint pain, headaches, an increased risk of infections, depression, difficulty concentrating, coordination problems, forgetfulness, anxiety, urinary urgency, anomia (difficulty finding words), dizziness, tinnitus, and sensations of pressure in the head and ears (Belyaev et al., 2016). The guide for practitioners opens with a similar list (Collective, 2020). To these is added brain fog, which we ourselves have experienced; the website of the diagnose:funk association notes that, in children, electro-hypersensitivity usually manifests itself as headaches, “brain fog,” and learning difficulties (Gutbier, 2021).

The World Health Organization, whose December 2005 fact sheet has not been replaced, considers these symptoms real: “The symptoms are certainly real and can vary widely in their severity”; whatever their cause, they can be disabling (WHO, 2005). Anses wrote in 2018 that the complaints “correspond to a lived reality” (Anses, 2018).

What characterizes the clinical picture is not any one symptom but its relationship to exposure: symptoms appear or worsen in the presence of sources and subside at a distance from them. The guide for practitioners makes this its main criterion: “The best diagnostic criterion remains the improvement, or even the disappearance, of symptoms after a prolonged cessation of exposure to electromagnetic fields” (Collective, 2020, p. 11).

3.2 Onset of Symptoms (4i)

The EUROPAEM guideline describes a gradual onset: depending on the individual state of sensitivity, symptoms often occur only from time to time, but over time they may increase in frequency and severity (Belyaev et al., 2016). Symptoms can also persist after exposure: the authors

of the most cited review of provocation studies themselves note that the electro-hypersensitive “sometimes report symptoms that can last for several days” (Rubin et al., 2005).

The link with exposure is often established only after years. A British author reports having diagnosed himself “6 years after my condition had started” (Ashton, 2025). One of us went through a comparable course: more than fifteen years of successive symptoms whose source he did not know, apart from the warming of the face felt during phone calls, before he could relate them to exposure by comparing what he felt with measurements, without ever having been told about electro-hypersensitivity. In both cases, the attribution did not precede the symptoms; it followed them.

3.3 The Individuals Affected (4j)

The known characteristics of the electro-hypersensitive—female predominance, age, associated conditions—are presented in Document 4 (Questions 10 and 11). Three features are of particular interest to the clinician. The first is the frequent association with multiple chemical sensitivity: in the cohort followed in Paris by the Association for Research and Treatments Against Cancer (ARTAC), it affects 25% to 30% of the electro-hypersensitive, depending on the publication (Belpomme and Irigaray, 2020; Irigaray et al., 2024). The second is the overlap with other syndromes that have no validated marker, which the EUROPAEM guideline groups together with electro-hypersensitivity among chronic multisystem illnesses: multiple chemical sensitivity, chronic fatigue syndrome, fibromyalgia (Belyaev et al., 2016). The third is a cellular radiosensitivity, found in all the volunteers of an Inserm cohort (Section 5.2).

In the Swiss survey, general practitioners holding a certificate in complementary medicine reported these consultations much more often (Huss and Röösl, 2006). Either patients turn to these physicians, or these physicians more readily recognize the link that patients allege; in either case, the frequency of the syndrome is difficult to estimate from general practice alone.

3.4 Exposure Patterns (4k)

In the Swiss survey, the sources that patients implicated were mainly base stations, power lines, and their own mobile phones (Huss and Röösl, 2006). The EUROPAEM questionnaire asks about the mobile phone, the DECT cordless phone, Wi-Fi, compact fluorescent lamps, a nearby antenna, power lines and transformers, and Bluetooth in the car (Belyaev et al., 2016). The exposure at issue is rarely that of a single source: it is the sum of public and domestic sources (Document 7, Section 5), and it is at night, in bed, that domestic sources are closest to the body. In our experience, the symptoms also vary with the sources involved, their frequencies, and the duration and intensity of exposure. Nor does the absence of symptoms in other members of the household rule out the link: they are not exposed in the same way from day to day, nor are they receptive in the same way (Section 5.4).

EUROPAEM derives from this a method of attribution: assessing the “variation in health problems depending on time and location and individual susceptibility” (Belyaev et al., 2016). It is a clinical method, based on repeated observation of what changes when exposure changes.

3.5 Assessment Methods: Two Doctrines (41)

There is no common standardized method. Two medical doctrines coexist, and they diverge on a decisive point.

	First doctrine: WHO (2005), SFST (2023)	Second doctrine: Austrian Medical Association (2012), EUROPAEM (2016), 2020 guide
Approach	Rule out other causes, medical and psychological	Thorough case history, focused on the relationship between symptoms, time, and place, with other causes ruled out
Exposure	No avoidance; very gradual exposure within cognitive behavioral therapy; measurements “most often unnecessary” in the general environment	Measurements entrusted to trained specialists; exposure reduction as the main treatment
Psychotherapy	Psychological evaluation; cognitive behavioral therapy offered	The same significance as in other illnesses
Coding	No specific code	Symptom codes, with R68.8 and Z58.4 (ICD-10)
Certificate	Never attest to electro-hypersensitivity; describe what the patient reports	Descriptive certificate, at the physician’s discretion

The WHO fact sheet states that treatment “should focus on the health symptoms and the clinical picture, and not on the person’s perceived need for reducing or eliminating EMF,” and recommends a medical evaluation and “a psychological evaluation to identify alternative psychiatric/psychological conditions” (WHO, 2005). In France, the document prepared by the SFST at the request of the Ministry of Health, online since January 2024 (Sénat, 2025), holds that “Measurements do not fall within medical competence,” that “devices for protection against electromagnetic fields show haphazard effectiveness in practice,” and that “Multiplying measurements can generate anxiety.” It concludes that “there is no argument to date for proposing avoidance of electromagnetic waves in individuals who describe themselves as EHS” and that “it could be beneficial to encourage very gradual exposure to electromagnetic waves within the framework of CBT,” since avoidance risks trapping the patient in “a vicious circle of increasing avoidance, leading to ever greater social and occupational isolation”; it points out that “listening and empathy are called for” (SFST, 2023).

The Austrian Medical Association starts from the same observation—“Es gibt keine EMF-spezifischen Befunde,” there are no findings specific to electromagnetic fields—but draws a different method from it: diagnosis rests essentially on a thorough case history, supplemented by stress markers interpreted together (Österreichische Ärztekammer, 2012). In 2018, Anses saw in it the document that was “probably the most elaborate with regard to the diagnostic approach,” while considering that this approach “would deserve to be the subject of clinical studies” (Anses, 2018).

EUROPAEM adopts this approach, entrusts measurements to trained and experienced specialists, and makes exposure reduction the main treatment, while calling for products claimed to neutralize electrosmog to be assessed with great restraint (Belyaev et al., 2016). The guide for practitioners, reviewed by the oncologist Dominique Belpomme and by a general practitioner, states: “Avoidance of harmful sources is essential for improvement or recovery” (Collective, 2020, p. 12).

The two doctrines agree on listening to the patient and on ruling out other causes. They diverge on one action, reducing exposure: the first advises against it, the second makes it both the treatment and the diagnostic test.

They also diverge on the medical certificate. In France, a note of May 26, 2014, from the Directorate General for Health leaves the issuing and content of certificates “to the physician’s discretion, case by case” (cited by Collective, 2020, p. 12); the SFST considers that “under no circumstances should a physician write on a certificate that he or she observes, or even confirms, a situation of EHS,” the physician being able only to certify that he or she is following the patient and to report what the patient describes (SFST, 2023). A court, for its part, was able to adopt an approach close to the second doctrine: the Riom Court of Appeal relied on certificates spread over time, describing the symptoms, their relationship to exposure, and the other diagnoses ruled out; in the view of the Riom Court of Appeal, general objections about the absence of harmfulness and compliance with exposure limits “have no bearing on this finding of an individual impact on health” (Riom Court of Appeal, 2025).

4. What Provocation Studies Test

4.1 The Protocol and Its Conclusion

Negative conclusions on the causal link rest mainly on so-called provocation studies: the subject is exposed, blind, sometimes to a real field and sometimes to a sham field, most often for a few minutes to a few tens of minutes, and what the subject perceives or feels is recorded. The most cited review brings together 31 experiments involving 725 volunteers who described themselves as electro-hypersensitive; it concludes that “it has proved difficult to show under blind conditions that exposure to EMF can trigger these symptoms. This suggests that ‘electromagnetic hypersensitivity’ is unrelated to the presence of EMF, although more research into this phenomenon is required” (Rubin et al., 2005). Its lead author belonged to the Mobile Phones Research Unit at King’s College London; the work was funded by the British Mobile Telecommunications and Health Research program, whose core funding, approximately £12 million, was provided “in approximately equal share by government and industry,” with projects selected and monitored by an independent management committee (MTHR, 2013). In France, the document given to physicians sums up: “the vast majority of the studies available for several decades find no correlation” (SFST, 2023).

The question of funding is not a neutral one. Among 59 experimental studies on the effects of radiofrequency exposure, those funded exclusively by industry were the least likely to report a statistically significant result: odds ratio 0.11 (95% confidence interval: 0.02 to 0.78) compared with studies funded by public agencies or charities (Huss et al., 2007); its 2010 update confirms this

result (Document 7, Section 6.2). One of the authors of this finding, Martin Rösli, later sat on the ICNIRP Commission from 2016 to 2024 (ICNIRP, 2026).

4.2 What the Authors Themselves Say

The limitations of this body of work are acknowledged by the very authors who draw negative conclusions from it.

- Rubin et al. (2005) note that “the majority of studies included relatively small sample sizes and failed to justify this by providing a power calculation” and that “Low statistical power might also explain some of the negative findings”; at least two studies reported hangover effects from one session to the next.
- A systematic review of 28 blinded studies, conducted by researchers from RWTH Aachen University and the Norwegian University of Science and Technology, identifies limitations “that might have either fostered false or masked real effects of exposure”: participant selection, order of exposures, effectiveness of blinding. It concludes that no effect has been demonstrated, adding: “If physical effects exist, previous findings suggest that they must be very weak or affect only few individuals with IEI-EMF,” and recommends studies conducted “at the individual level” (Schmiedchen et al., 2019).
- EUROPAEM criticizes these studies for short exposures and short observation periods, for sessions spaced too closely together, which neglect post-exposure effects, and for sham exposures carried out under conditions likely to provoke a response in sensitive individuals (Belyaev et al., 2016).
- In 2018, Anses recommended “that provocation studies using polysomnography be carried out” (Anses, 2018).
- In 2025, Frank de Vocht, a member of the ICNIRP Commission and an occasional consultant to the Electric Power Research Institute, and Martin Rösli wrote that “there is little value in continuing the same research.” They propose “the single-case repeated design” and a model based on long-term exposure, while maintaining that “psychogenic reactions play an important role” (de Vocht and Rösli, 2025).

4.3 A Test of Perception, Not a Test of Effect

These studies ask the patient a question—do you perceive the exposure, do you feel a symptom, right now?—that is not the clinical question. The clinical question is the one posed by the guide for practitioners: do the symptoms improve when exposure ceases for a sustained period? Three gaps separate the two.

- **Duration.** A few minutes or tens of minutes of exposure, whereas the symptoms are described as gradual, cumulative, and sometimes long-lasting (Section 3.2).
- **What is measured.** A subjective judgment, not a state of the body. Yet as early as 2005, the WHO stated that “hyper reactivity in the central nervous system and imbalance in the autonomic

nervous system need to be followed up in clinical investigations” (WHO, 2005), and Anses called for the use of polysomnography.

- **Participants.** Patients with severe forms, who cannot tolerate a prolonged stay in an exposed environment, are by construction the least likely to take part in a laboratory experiment; the authors of the Inserm study themselves note “the difficulty for EHS patients to move, travel, and leave their homes where they often have protection against waves” (Sonzogni et al., 2025).

Nonhuman living organisms, for their part, “perceive” nothing, and yet they react (Document 6): for the robin or the tadpole, the organism is measured; the electro-hypersensitive individual is asked what he or she feels.

The nocebo effect exists: the expectation of harm can cause symptoms, and experiments show this (de Vocht and Röösl, 2025). It is not enough to explain a course in which symptoms precede any attribution to waves by several years (Section 3.2). The German association diagnose:funk, which campaigns against exposure to electromagnetic fields, puts it this way: “Bei einem Nocebo-Effekt müssen die Bedenken am Anfang stehen”—in a nocebo effect, the concern must come first (Haidlauf, 2026).

5. Biology: Leads, No Validation

5.1 The Markers of the ARTAC Cohort

Since 2009, ARTAC has followed in Paris a cohort of more than 2,000 cases of electro-hypersensitivity, multiple chemical sensitivity, or both. Its researchers measured blood and urine markers—histamine, heat shock proteins, S100B protein, nitrotyrosine, anti-myelin antibodies, urinary melatonin—and report that with seven markers, 76% to 86% of cases can be objectively characterized (Irigaray et al., 2024). According to them, their clinical observations “strongly suggest” that these are “objective somatic disorders, which can neither be claimed as originating from some psychologic or psychiatric-related conditions, nor from nocebo effects” (Belpomme and Irigaray, 2020).

They themselves acknowledge the limitations: “none of our biomarkers are per se specific” (Belpomme et al., 2015); the assays were performed in a single Paris laboratory, and “these biochemical tests remain to be reproduced by other laboratories” (Irigaray et al., 2024). This work is funded by ARTAC, which in 2015 declared donations from patients and grants from foundations, and, for the 2020 article, partly by the Osato Research Institute (Japan). The first author of that article is a co-inventor of a U.S. patent, held by the company Osato International, on the treatment of electro-hypersensitivity with a fermented papaya preparation (Osato International Inc, 2021); the guide for practitioners recommends this preparation under its trade name (Collective, 2020, p. 12). In 2018, Anses judged these results “to be considered as preliminary results, to be interpreted with the greatest caution,” to be confirmed using validated assay methods and matched controls (Anses, 2018). An international survey of 142 individuals from 21 countries who described themselves as electro-hypersensitive, 62 of whom had a medical diagnosis, starts from an observation—“There are

no medical tests for detecting sensitivity to wireless radiation”—and concludes that “currently, it is not possible to diagnose sensitivity to wireless radiation exposures”; the results reported “certainly indicate some kind of physiological stress but there is no evidence that this physiological stress was caused or is modulated by EMF exposures” (Leszczynski, 2025). Its author, a researcher at the University of Helsinki, was funded by a grant from the Finnish Electrosensitivity Foundation.

The EUROPAEM guideline, for its part, proposes a laboratory workup organized by type of sample: in blood, markers of oxidative and nitrosative stress (nitrotyrosine, malondialdehyde, glutathione), of inflammation (high-sensitivity C-reactive protein, interleukin-1, TNF-alpha, IP-10), histamine and diamine oxidase, vitamin D3, and thyroid hormones; in the second morning urine, adrenaline, noradrenaline, dopamine, and serotonin; in 24-hour urine, the ratio of 6-sulfatoxymelatonin to creatinine; in saliva, cortisol at 8 a.m., noon, and 8 p.m., and, in addition, DHEA and alpha-amylase (Belyaev et al., 2016). These tests serve to assess the state of the body and to monitor its course as exposure decreases; none is specific, and Anses noted that the choice of these markers and tests “is not substantiated” (Anses, 2018).

5.2 Fibroblast Radiosensitivity (the DEMETER Study)

A public research team approached the question by another route. In Lyon, Inserm joint research unit 1296 applied its clinical radiobiology protocol to skin fibroblasts from 26 volunteers who described themselves as electro-hypersensitive: “By applying X-rays, all the DEMETER cell lines (26/26) appeared characterized by delayed radiation-induced ATM nucleoshuttling (RIANS)”; the biological data were acquired before the sealed questionnaires were opened. According to the laboratory’s earlier literature, radioresistant individuals represent about 75% to 85% of the population. The authors derive from this “a preliminary molecular model of EHS,” while specifying that “a given patient showing delayed RIANS does not necessarily suffer from EHS.” They themselves point out the small size of the cohort and a possible “group effect,” since the volunteers belong to the same association; the controls come from an earlier collection of the laboratory, and the exposure tested is to X-rays, not radiofrequency (Sonzogni et al., 2025). The study was co-funded by Anses. It does not demonstrate that radiofrequency acts through this mechanism; it shows that these volunteers share a measurable biological feature, established without relying on their own statements.

5.3 The Circularity Objection

Two members of ICNIRP object that the search for biomarkers “suffers from circular reasoning”: to test a marker, the electro-hypersensitive must be identified, which, in the absence of a marker, can only be done through their own self-report (de Vocht and Röögli, 2025). The objection applies to any clinically defined syndrome, such as migraine, fibromyalgia, or chronic fatigue syndrome; medicine usually answers it by setting clinical criteria and then testing markers prospectively. Chronic fatigue syndrome provides the precedent: long disputed, it was presented in 2015, on the publication of the report of the U.S. Institute of Medicine, as a “legitimate, serious, and complex systemic disease,” and the committee chair identified “the skepticism of health care providers about these patients” as an obstacle to diagnosis (IOM, 2015). The absence of a validated marker at a given

time does not prove a psychological origin. Designs based on removing exposure, moreover, escape the objection: they do not ask the patient to attribute his or her symptoms; they observe what changes when exposure ceases.

5.4 The Individual Tolerance Threshold

Several readings converge on the same idea: what matters is not only the intensity of the signal but the body's capacity to withstand it. EUROPAEM attributes most symptoms to inadequate regulation (decompensation) and proposes adjusting the duration of provocation tests according to individual regulatory capacity (Belyaev et al., 2016). A cellular mechanism has been proposed: according to a 2013 review, twenty-three studies show that blockers of voltage-gated calcium channels, located in cell membranes, abolish or greatly reduce various effects of electromagnetic fields, and the pathological effects would involve calcium entry into the cell, followed by the nitric oxide, peroxynitrite, and oxidative stress pathway (Pall, 2013). This hypothesis remains debated; its author, a biochemist and professor emeritus at Washington State University, is engaged in criticism of the standards. It is consistent with the markers of oxidative and nitrosative stress reported by ARTAC (Section 5.1). A physician, Dr. Mohamed Boutbaoucht, derives a clinical model from it, in an undated article whose publisher has not been identified: electro-hypersensitivity would reflect the loss of a “cellular tolerance threshold,” linked to the state of the mitochondria, of membranes and ion channels, of minerals, of the microbiota, and of mast cells (Boutbaoucht, 2026). To our knowledge, this model has not been published in a peer-reviewed journal.

Two consequences follow. A lowered individual threshold does not lessen the responsibility of exposure: it explains why the same exposure, tolerated by some, makes others ill, and it calls for reducing exposure at the source, not for adapting individuals to it. And, in our experience, sheltering from radio waves alleviates the symptoms, but the sensitivity remains, so protection must be lasting.

6. Between Two Doctrines, Diagnostic Wandering

The course described on the website of the diagnose:funk association (cited in Section 4.3) resembles the one we ourselves went through: attending physician, blood tests, electrocardiogram, then ophthalmologist, ear, nose, and throat specialist, or neurologist; “Die somatische Diagnostik ist nicht wegweisend” (the somatic workup is not indicative); for lack of any other explanation, the disorders are then often classified “als stressbedingt oder psychosomatisch,” as stress-related or psychosomatic (Gutbier, 2021). EUROPAEM adds that some individuals with EHS may be misdiagnosed with multiple sclerosis (MS), since most of the symptoms are similar (Belyaev et al., 2016).

The resemblance lies in the nature of these symptoms. France's Haute Autorité de santé describes multiple sclerosis as an “inflammatory disorder of the central nervous system,” in which fatigue is “one of the most disabling symptoms” and which combines “motor, sensory, cognitive, visual, bladder and sphincter, and genito-sexual disorders, among others” (HAS, 2024). The EUROPAEM list for electro-hypersensitivity likewise includes fatigue, difficulty concentrating, coordination

problems, dizziness, and urinary urgency (Section 3.1). These signs, described as nonspecific, indicate that something is wrong without identifying the cause: very different conditions can produce the same clinical picture.

What distinguishes the two, then, is not the clinical picture but the tests. The diagnosis of multiple sclerosis rests on international criteria, known as the McDonald criteria, which require demonstrating the dissemination of central nervous system lesions in space and in time; where dissemination in space has been demonstrated, the presence of specific oligoclonal bands in the cerebrospinal fluid allows the diagnosis; and the criteria stress that there must be no better explanation for the presentation (Thompson et al., 2018). Their 2024 revision adds the optic nerve as a fifth location and accepts, as supportive evidence, imaging signs and the measurement of kappa free light chains in the cerebrospinal fluid (Montalban et al., 2025). Electro-hypersensitivity has, to date, no validated marker (Section 5); what characterizes it is the relationship between symptoms and exposure (Section 3.1).

Misdiagnosis is, moreover, common in neurology, quite apart from radio waves. At four U.S. academic centers, 110 patients who had been wrongly diagnosed with multiple sclerosis in fact had, among other conditions, migraine (22%), fibromyalgia (15%), nonspecific neurological symptoms with an abnormal MRI (12%), or a conversion or psychogenic disorder (11%); among the leading causes of the error was “overreliance on MRI abnormalities in patients with nonspecific neurologic symptoms”; 70% of these patients had received disease-modifying therapy, and the misdiagnosis had lasted ten years or more for a third of them (Solomon et al., 2016). At two centers in California, 17% and 19% of the 241 patients referred with an established diagnosis of multiple sclerosis had been misdiagnosed, migraine being the most common alternative diagnosis (Kaisey et al., 2019). The first author of the 2016 study, who took part in revising the criteria, considers that the 2024 revision carries a risk of overdiagnosis (Solomon and Brodersen, 2025).

EUROPAEM’s remark is consistent with this finding: a patient whose symptoms depend on exposure may, on the strength of nonspecific MRI abnormalities, receive a diagnosis of multiple sclerosis or, if the MRI is normal, that of a psychogenic disorder, as long as the question of exposure is not asked. One hypothesis goes further: among the markers measured by ARTAC are anti-myelin antibodies (Section 5.1), whereas myelin, the sheath of nerve fibers, is the target of multiple sclerosis, a so-called demyelinating disease (Solomon et al., 2016). This lead has not been validated (Sections 5.1 and 5.3): it could explain the similarity of the symptoms; it does not prove that the two are the same condition.

Our experience sheds light on three mechanisms. The presentation changes over time—urinary problems, tachycardia, nausea, visual disturbances, insomnia, tinnitus—and each symptom leads to a different specialist; it is the succession itself, with no visible common thread, that can earn the patient the label of hypochondriac. Time is short: our consultations lasted about fifteen minutes. Finally, the literature is mostly in English: a general practitioner we consulted, who had done independent research, found that it exists, that it is almost entirely in English, and that it is not a matter of consensus.

The outcome may be giving up: the patient stops seeking care and disappears from health care statistics. The document given to French physicians itself identifies “The breakdown of the therapeutic relationship with the medical profession” as “a major danger” (SFST, 2023). In 2018, Anses judged that the suffering expressed “requires and justifies appropriate care by the health care system,” and that “it is above all essential to establish and preserve a climate of trust” (Anses, 2018). A doctrine that asks physicians not to center care on exposure reduction, when the patient has observed, sometimes for years, that his or her symptoms depend on it, makes such trust difficult.

7. Information for Health Professionals (Question 9)

What health professionals mainly receive today is a conclusion. The WHO fact sheet asks governments to provide them with information that includes “a clear statement that no scientific basis currently exists for a connection between EHS and exposure to EMF” (WHO, 2005). In France, Anses recommended in 2018 to “develop physician training on the issue of the effects of radiofrequency on health,” and to ask the Haute Autorité de santé to consider whether care recommendations were warranted, as it had done for fibromyalgia (Anses, 2018). At the end of 2019, the Ministry entrusted the drafting of practical guidance to the SFST, whose document has been online since January 2024 (Sénat, 2025).

To assess an individual case, the physician needs information of a different kind.

- **The patient’s exposure:** location and power of nearby transmitters, results of measurements at home and at the workplace, domestic sources (Document 3). Measurement is not within the physician’s competence, as the SFST points out; it must therefore be accessible to the physician, carried out by trained specialists, as EUROPAEM requests, noting that it is generally not covered by health insurance (Belyaev et al., 2016).
- **How devices behave:** a mobile phone emits even when no call is in progress, and the base of an ordinary DECT cordless phone even when idle (Document 7, Section 5.1); measured in contact with the body, the specific absorption rate of one phone model led France to suspend its sale in 2023 (Document 3, Section 3.5).
- **Reference values and their status,** from regulatory limits to precautionary values, to interpret a measurement (Document 7, Section 5.3).
- **The actual state of medical knowledge:** the two doctrines, the limitations of provocation studies, the biological leads and their status, the codes that can be used (Sections 3 to 5; Document 4, Section 3.2).
- **Possible accommodations.** In the United States, the U.S. Access Board states that, under the Americans with Disabilities Act and other disability laws, public and commercial buildings must provide reasonable accommodations for individuals with chemical or electromagnetic sensitivities; among the accommodations it lists as possible at the patient’s request is requiring that cell phones and computers be turned off; the page, which is undated, is part of the research section of the agency’s website and does not state its regulatory status (U.S. Access Board, 2026).

Document 9 offers a practical version of this information for primary care physicians.

8. Reporting of Adverse Effects (Question 10f)

In the United States, the Food and Drug Administration offers a form for reporting “accidental radiation occurrences,” open to manufacturers and to the public for any radiation incident or potentially hazardous event, and the MedWatch system for medical products; the page presenting them mentions neither phones nor wireless devices (FDA, 2018). In France, the electro-hypersensitive can be seen at the regional centers for occupational and environmental diseases, at their own request or at that of their attending physician or occupational physician (Sénat, 2025). These centers feed the common database of a national vigilance network, coordinated by Anses, which records about 30,000 consultations a year and whose mission is to identify emerging occupational and environmental risks (Anses, 2026); the page presenting this network does not mention electromagnetic fields. To our knowledge, there is no system, either in Europe or in the United States, that allows a patient or a physician to report symptoms attributed to radiofrequency exposure and to obtain, in return, a measurement of that exposure.

Such a system would have three advantages: detecting signals, in particular clusters of symptoms after a transmitter is brought into service (Document 4, Section 5); building, together with the measurements, a database useful for research; and recognizing what patients are going through. It would face three difficulties, each of which can be overcome. The lack of a specific code: existing codes make up for it (Document 4, Section 3.2). Attribution bias: a standardized questionnaire that records symptoms without asking about their cause, together with a measurement of exposure where the patient lives, corrects it. Underreporting: discouraged patients no longer seek care (Section 6), and only direct access, without having to go through a physician, would reach them.

9. Gaps in Medical Research (Questions 4m and 16)

Document 7 ranks the diagnosis and follow-up of electro-hypersensitivity among research priorities (Document 7, Section 3.3). From a medical standpoint, we detail six of them.

1. **Provocation protocols designed on the basis of what patients describe:** long and repeated exposures, sufficient intervals between sessions, conducted at home rather than in the laboratory so as to include severe forms, with physiological endpoints—heart rate variability, polysomnography, biological markers—rather than perception alone; repeated single-case designs, recommended by Schmiedchen et al. (2019) as well as by de Vocht and Rösli (2025).
2. **Trials based on removing exposure:** real or sham reduction of exposure at the sleeping place, blinded, with monitoring of symptoms and physiological markers. This is the experimental translation of the diagnostic criterion adopted by practitioners (Section 3.1).
3. **Independent replication of the biological findings:** replication of the ARTAC markers, with validated methods and matched controls, as Anses requested; replication of the radiosensitivity found by Inserm, with controls recruited for the study and exposure to radiofrequency.

4. **Validation of clinical diagnostic criteria**, building on the Austrian and European guidelines; Anses considered the former worthy of clinical studies and noted, regarding the latter, that “The choice of these various markers and tests is not substantiated.”
5. **Study of the overlaps** with multiple chemical sensitivity, chronic fatigue syndrome, and fibromyalgia, which share a common core of symptoms.
6. **Study of the medical pathway itself**: time to diagnosis, number of physicians consulted, misdiagnoses, forgoing of care. We know of no quantitative data on these points.

This research requires stable public funding and governance independent of industry (Document 7, Section 3.6).

10. Discussion

The title of our contribution, “Electro-Hypersensitivity Does Not Exist,” echoes a phrase that the electro-hypersensitive often hear. The institutional texts do not say this: the WHO considers the symptoms real and sometimes disabling; Anses, a lived reality that justifies care. What they say is that no scientific basis links these symptoms to exposure. This conclusion rests on a type of study that asks a different question from the clinician’s: not “does exposure make the patient ill?” but “does the patient perceive it at that moment?” The authors of these studies acknowledge their limitations, and members of ICNIRP now propose no longer repeating them unchanged. The clinical question—do the symptoms subside when exposure ceases for a sustained period?—has not, to our knowledge, been the subject of a research program commensurate with the problem.

In the meantime, the doctrine the physician follows decides the patient’s fate. That of the WHO directs the physician toward ruling out other causes and toward psychological evaluation; that of the Austrian physicians and EUROPAEM, toward reducing exposure. The simple measures the latter proposes—switching off a router at night, moving a phone away from the bed, connecting a computer by cable—have no known physical adverse effect; the SFST, however, sees in the multiplication of avoidance measures a risk of isolation. This doctrine also has limits, which are not medical: patients can reduce the sources in their own homes, but they can do nothing about the nearby base station antenna, the small cell on their street, or the building’s meter. For severe forms, the guide for practitioners contemplates that patients may have to protect themselves from these sources “or move” (Collective, 2020, p. 12); there must still be places left to go. The medical care of electro-hypersensitivity thus converges with reducing exposure at the source throughout the territory and preserving white zones (Documents 1, 4, and 5).

11. Limitations

Published observations by clinicians are rare; the Swiss survey was conducted in 2005 and its response rate was 28%. The sources are mostly European. The ARTAC markers come from a single team, without replication; the Inserm study covers 26 volunteers from the same association. Passages from the Anses expert report are cited from our reading notes. Passages from EUROPAEM

are paraphrased from the 2016 French translation, except the one quoted from the original English text. The publications on misdiagnosis of multiple sclerosis are cited from their abstracts and do not concern electro-hypersensitivity. Our own course is a testimony, not data.

12. Recommendations (Questions 4, 9, 10f, and 16)

1. In federal communications intended for health professionals, state what institutions already acknowledge: the symptoms are real and can be disabling; no biological marker has yet been validated, so that no test currently makes it possible to link electro-hypersensitivity to exposure or to rule it out on the basis of normal results; provocation studies test the perception of a brief exposure, not its effects. Make known the markers proposed by ARTAC and Inserm, which remain to be replicated (Section 5), and the criterion adopted by the guide for practitioners: improvement of symptoms when exposure ceases (Section 3.1).
2. Have practice recommendations drawn up by a group independent of industry, including clinicians who follow electro-hypersensitive patients, based on the relationship between symptoms, time, and place; on ruling out other causes; on the use of existing codes; and on exposure reduction as the first measure, at home as well as at the source.
3. Train health professionals in exposure sources, device behavior, reference values, and the actual state of knowledge, and give them access, for their patients, to exposure measurements carried out by trained specialists, at no cost to the patient.
4. Create a public system for reporting symptoms attributed to electromagnetic fields, open directly to patients as well as to physicians, combined with a measurement of exposure where the patient lives and a standardized questionnaire, and whose anonymized data are made public.
5. Fund clinical research designed on the basis of what patients describe: long and repeated exposures, at home, physiological endpoints, single-case designs, and blinded trials of removing exposure at the sleeping place.
6. Have the biological markers and the radiosensitivity described in electro-hypersensitive individuals replicated by laboratories independent of one another and of industry, with matched controls, and validate clinical diagnostic criteria.
7. Make health care facilities accessible to the electro-hypersensitive—low-exposure waiting rooms and patient rooms, phones switched off—as the U.S. Access Board already recommends for public buildings.
8. Preserve the white zones that remain and reconstitute others, where the most severely affected electro-hypersensitive individuals can live and receive care, and reduce exposure at the source throughout the territory: otherwise, the only treatment that practitioners consider effective will remain out of reach.

Glossary

Term	Meaning
ADA	Americans with Disabilities Act: U.S. federal law of 1990 on the rights of individuals with disabilities.
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
ARTAC	Association pour la recherche thérapeutique anti-cancéreuse (Association for Research and Treatments Against Cancer): French association, founded by the oncologist Dominique Belpomme, which has followed a cohort of electro-hypersensitive patients since 2009.
ATM, RIANs	The ATM protein takes part in DNA repair; RIANs (radiation-induced ATM nucleoshuttling) refers to its migration to the nucleus after irradiation, a delay in which is the signature of radiosensitivity.
Biomarker	Measurable biological parameter, in blood, urine, or a tissue, that provides information on a state or a process of the body.
Blind study	Study in which the participant, and sometimes the experimenter, does not know whether the exposure is real or sham.
Case history (anamnesis)	Account, gathered by the physician, of the patient's history and symptoms.
Cerebrospinal fluid	Fluid that bathes the brain and spinal cord; it is collected by lumbar puncture.
Chronic fatigue syndrome	Myalgic encephalomyelitis: an illness characterized by disabling fatigue made worse by exertion, which the IOM proposed in 2015 to rename "systemic exertion intolerance disease."
Chronic multisystem illnesses	Category proposed by EUROPAEM for disorders of environmental origin affecting several systems of the body: multiple chemical sensitivity, chronic fatigue syndrome, fibromyalgia, electro-hypersensitivity.
Cluster (of cases)	Grouping, in a place or a period, of cases of the same disorder that are more numerous than expected.
Cognitive behavioral therapy (CBT)	Psychotherapy that aims to modify the thoughts and behaviors associated with a disorder.
Cohort	Group of individuals followed over time to observe the occurrence or the course of a disorder.
Conversion disorder, psychogenic disorder	Disorder in which neurological symptoms, with no lesion to explain them, are attributed to a psychological factor.
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
EHS	Abbreviation of electro-hypersensitivity used by the sources cited.
Electric Power Research Institute	U.S. nonprofit research institute funded by the electric power sector.

Term	Meaning
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
Electrosmog	All the artificial electromagnetic fields to which a human being is exposed at a given moment.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
FDA	Food and Drug Administration: U.S. federal agency responsible, among other things, for radiation-emitting products.
Fibroblast	Connective tissue cell; skin fibroblasts are easy to culture and are used for radiosensitivity tests.
Fibromyalgia	Syndrome combining widespread pain, fatigue, and sleep disorders, with no validated biological marker.
Haute Autorité de santé	French National Authority for Health: French public authority responsible, among other tasks, for drawing up good practice guidelines for health professionals.
Heart rate variability	Variation in the interval between two heartbeats, reflecting the activity of the autonomic nervous system.
Heat shock proteins (Hsp27, Hsp70)	Proteins produced by cells in response to stress.
HSEM	Hypersensibilité électromagnétique (electromagnetic hypersensitivity): abbreviation used in the French version of the WHO fact sheet.
ICD-10	International Classification of Diseases of the WHO, tenth revision. R68.8 designates “Other specified general symptoms and signs,” and Z58.4, exposure to radiation.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
IEI-EMF, IEI-CEM	Idiopathic environmental intolerance attributed to electromagnetic fields (IEI-CEM is the French abbreviation); term adopted by the WHO and Anses; “idiopathic” means that the cause is unknown.
Inserm	Institut national de la santé et de la recherche médicale (French National Institute of Health and Medical Research): French public body for biomedical research.
IOM	Institute of Medicine, now the National Academy of Medicine: U.S. academy that advises the federal government on health matters.
Mast cell	Immune system cell that releases histamine and other mediators of inflammation.
McDonald criteria	International diagnostic criteria for multiple sclerosis, revised several times, most recently in 2024.

Term	Meaning
MedWatch	FDA system through which health professionals and patients report adverse effects of medical products.
MRI	Magnetic resonance imaging: imaging technique that shows, among other things, lesions of the brain and spinal cord.
MTHR	Mobile Telecommunications and Health Research: British research program on mobile telephony and health, funded by government and industry.
Multiple chemical sensitivity	Syndrome of symptoms affecting several organs upon exposure to various chemical substances at concentrations well below those that affect the general population.
Multiple sclerosis (MS)	Inflammatory disease of the central nervous system in which myelin is destroyed in places; its diagnosis rests on the McDonald criteria.
Myelin	Sheath that surrounds nerve fibers and speeds up the conduction of nerve impulses.
Nitrotyrosine	Marker of nitrosative stress, produced by the action of peroxynitrite on proteins.
Nocebo effect	Adverse effect attributed to the expectation of harm rather than to the agent itself.
Odds ratio	Measure of statistical association; a value of 0.11 means that the event is about nine times less likely, in terms of odds, in one group than in the other.
Oligoclonal bands	Antibodies produced in the central nervous system and detected in the cerebrospinal fluid; their presence supports a diagnosis of multiple sclerosis.
Polysomnography	Simultaneous recording, during sleep, of brain, cardiac, respiratory, and muscle activity.
Provocation study	Experiment in which a subject is exposed, blind, to a real or sham field, and what the subject perceives or feels is recorded.
Radiosensitivity	Increased sensitivity of an individual or of their cells to ionizing radiation.
Regional centers for occupational and environmental diseases	French hospital consultations specializing in work-related and environment-related diseases; they feed the national vigilance network coordinated by Anses.
Repeated single-case design	Protocol in which the same individual is exposed several times, blind, to real and sham conditions, the individual's responses being analyzed individually.
S100B	Protein produced mainly by the glial cells of the nervous system, used as a marker of brain damage.
SFST	Société française de santé au travail (French Society of Occupational Health); learned society of occupational medicine and occupational health.
Small cell	Low-power, short-range antenna installed close to the ground, on street furniture or building facades, and connected to the operator's network like a base station; "small-area wireless access point" in European Union law (see Document 5, Section 4.1).
Specific absorption rate (SAR)	Power absorbed per unit mass of tissue, in watts per kilogram; it is used to check the compliance of devices worn near the body.

Term	Meaning
U.S. Access Board	U.S. federal agency responsible for accessibility rules for individuals with disabilities.
Voltage-gated calcium channels	Channels in cell membranes that open in response to a change in electrical potential and let calcium into the cell.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).
WHO	World Health Organization.
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Non-binding document, drafted and transmitted with all reservations whatsoever.

Electro-Hypersensitivity Does Not Exist

Document 9 — Electro-Hypersensitivity in Brief, for Primary Care Physicians: Practical Pointers

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Question addressed: 9 (information for health professionals).

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Disclaimer: the authors are not physicians. The medical elements presented here—tests, biological markers, exposure-reduction measures—are reported from published sources and existing guidelines, which are cited. They constitute neither medical advice, nor a prescription, nor a care protocol, and they do not replace the judgment of a health professional.

Abstract

The primary care physician is the first point of contact for patients whose symptoms may be due to exposure to electromagnetic fields. In our experience, most of these patients know nothing about electro-hypersensitivity and consult for their symptoms; those who arrive describing themselves as electro-hypersensitive reached that conclusion on their own, often after several years (Document 8, Section 3.2). This document offers a model of the information that could be provided to that physician: a few pages, drawn from Documents 7 and 8 and their sources, that set out what is known and what is not known, how to recognize the clinical picture, which diseases are associated with it, which tests to perform, how to reduce exposure, how to receive the patient, how to document the patient's record, and where to refer the patient. The World Health Organization (WHO) regards the symptoms as real; no validated test can currently confirm or rule out the diagnosis. A public research team at Inserm has nevertheless found, in all 26 electro-hypersensitive volunteers it studied, without exception, the same feature of their cells, a delay in DNA repair, established without relying on their own statements; other biological markers are under study, without independent validation. Other syndromes are often associated with electro-hypersensitivity, and Lyme disease, whose persistent symptoms resemble it, can overlap with it. Two medical doctrines are opposed on exposure reduction. These pointers do not replace the physician's judgment. The document sets out four recommendations.

1. Purpose

Question 9 of the Request for Information asks what technical and exposure-related information should be disclosed to, among others, health care providers. Document 8 (Section 7) lists that information; this document provides a practical version of it, as it could be handed to a general practitioner. It is drafted from European experience and refers to its source at every point.

2. Methods and Sources

The pointers are drawn from Documents 7 and 8 and from the sources they cite, read as described in Document 8 (Section 2): the articles by the ARTAC team and the Inserm study on biological markers, the 2005 WHO fact sheet, the 2018 opinion of Anses (French Agency for Food, Environmental and Occupational Health & Safety), the 2023 document of the French Society of Occupational Health (SFST), the guidelines of the Austrian Medical Association (*Österreichische Ärztekammer*, 2012) and of the European Academy for Environmental Medicine, EUROPAEM (Belyaev et al., 2016), the guide for practitioners *Et si c'était les ondes ?* [What if it were the waves?] (2020), the fact sheet of the Swiss Federal Office of Public Health (FOPH) on cordless phones (2016), and the recommendations of the U.S. Access Board. The following were consulted: the WHO fact sheet, in English and in French; the EUROPAEM guideline, in its 2016 French translation, of which only the English version is authoritative (the one passage quoted directly in this English version is from the original English text, and the others are paraphrased from the French translation); the 2020 guide; the Swiss federal office's fact sheet; the judgment of the Riom Court of Appeal. The 2018 Anses opinion was reread; the SFST document was read by an automated reading tool, and the passages quoted were checked against the text of the PDF; the U.S. Access Board pages and the ministerial response published in the *Journal officiel du Sénat* [Official Journal of the French Senate] were consulted in their own text. For the associated diseases, the abstracts of the articles by Talkington and Nickell (1999), Adelson et al. (2004), Kugeler et al. (2021), and Frątczak et al. (2020) were read, as well as the pages of the diagnose:EHS website; the page of the Centers for Disease Control and Prevention and the 2022 report of the Tick-Borne Disease Working Group were read with a summarization tool, the latter in part, and the passages quoted from them were not checked against the original text. Where these sources diverge, the divergence is indicated. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. What Is Known, What Is Not Known

- **The symptoms are real.** WHO states it: “The symptoms are certainly real and can vary widely in their severity” (WHO, 2005). Anses adds that the suffering expressed “requires and justifies appropriate care by the health care system” (Anses, 2018).
- **No test is conclusive, but one result stands out.** No biological marker has been validated. A public research team at Inserm found, in 26 out of 26 electro-hypersensitive volunteers, a delay

in the repair of their cells' DNA, measured without relying on their own statements; this result, like the markers described by the ARTAC team, has yet to be replicated (Section 6; Document 8, Section 5).

- **Provocation studies test a perception.** They briefly expose the patient to a real or sham field and ask what the patient feels; they measure neither delayed effects nor the effects of prolonged exposure (Document 8, Section 4).
- **Two doctrines coexist.** [WHO \(2005\)](#) and the [SFST \(2023\)](#) focus management on the symptoms and the clinical picture, not on exposure reduction; the SFST sees no argument for proposing avoidance and suggests, where appropriate, very gradual exposure within the framework of cognitive behavioral therapy. The Austrian Medical Association, EUROPAEM, and the 2020 guide make exposure reduction the main treatment; the guide also regards it as the best diagnostic criterion (Document 8, Section 3.5).

4. Recognizing

The most frequent symptoms are nonspecific: sleep disorders, headaches, fatigue, concentration and memory problems (“brain fog”), tinnitus, dizziness, palpitations, muscle and joint pain, tingling or burning sensations, urinary disorders ([Belyaev et al., 2016](#); [Collective, 2020](#)). What is suggestive is their relationship to exposure. EUROPAEM proposes the assessment of “variation in health problems depending on time and location and individual susceptibility” ([Belyaev et al., 2016](#)). Useful questions:

- Do the symptoms change with the place (home, work, other accommodation, vacation) and the time (night, day, weekend)?
- What sources are present in the home, particularly near the bed: Wi-Fi router, cordless phone base, cell phone, connected devices, smart meter?
- Was an antenna installed or modified nearby, or new equipment put into service, before the onset or worsening of the symptoms?
- Do the symptoms subside away from the sources, and how quickly?

The connection is often made late, after years of successive symptoms seen by different specialists; the shifting presentation exposes the patient to the label of hypochondria (Document 8, Section 6). In our experience, the symptoms vary with the sources involved, their frequencies, and the duration and intensity of exposure; and the absence of symptoms in other members of the household does not rule out the link, since they are not exposed in the same way from day to day, nor are they receptive in the same way (Document 8, Sections 3.4 and 5.4).

5. Associated Diseases

Electro-hypersensitivity rarely occurs alone. Multiple chemical sensitivity is frequently associated with it, in 25% to 30% of cases in the ARTAC cohort (Document 8, Section 3.3); the authors see in this association “a common pathological mechanism” ([Belpomme et al., 2015](#)). EUROPAEM groups

electro-hypersensitivity, together with multiple chemical sensitivity, chronic fatigue syndrome, and fibromyalgia, among chronic multisystem illnesses (Belyaev et al., 2016). Their clinical pictures overlap widely—fatigue, unrefreshing sleep, widespread pain, brain fog, headaches—and none of them has a validated marker (Document 8, Sections 3.3 and 5.3).

Lyme disease. It calls for particular attention in the United States, where it is estimated to be diagnosed and treated in about 476,000 patients a year, according to commercial health insurance claims data (Kugeler et al., 2021). Its persistent symptoms resemble those of electro-hypersensitivity: the Centers for Disease Control and Prevention (CDC) note that, after treatment, some patients have “prolonged symptoms of fatigue, body aches, or difficulty thinking,” and that “The cause of these symptoms is currently unknown” (CDC, 2026). The patient’s course is similar as well. The federal Tick-Borne Disease Working Group, in its 2022 report to Congress, reports patients who describe having been “dismissed by providers, being accused of lying,” and cites a survey published in 2014 according to which 78% of patients with a persistent or chronic form of the disease waited six months or more for their diagnosis (Tick-Borne Disease Working Group, 2022); this is the diagnostic wandering described in Document 8, Section 6.

In our experience, the two can overlap: in a patient with Lyme disease, with or without erythema migrans, exposure to waves further complicates the situation. The website of the German association diagnose:funk, moreover, lists borreliosis among the infections that, in its view, increase vulnerability to fields, and testing for it, together with testing for coinfections, among the laboratory analyses it presents; it cites no study in support (Gutbier, 2021; Gutbier, 2026). To our knowledge, no study published in a peer-reviewed journal has established a direct link between Lyme disease and electro-hypersensitivity, measured how often they occur together, or examined the effect of radiofrequency radiation on *Borrelia burgdorferi*, the bacterium responsible. A common pathway is conceivable, though not demonstrated: in culture, *Borrelia burgdorferi* spirochetes induce, in rat and mouse mast cells, weak but detectable degranulation and the secretion of TNF-alpha, a molecule of inflammation (Talkington and Nickell, 1999); and histamine, which mast cells release, is the marker most often elevated in the ARTAC cohort (Section 6.2).

Coinfections. The ticks that transmit Lyme disease also transmit other agents. In northern New Jersey, PCR analysis of *Ixodes scapularis* ticks detected *Borrelia burgdorferi* in 33.6% of them, *Babesia microti* in 8.4%, *Anaplasma phagocytophilum* in 1.9%, and *Bartonella* in 34.5%; the authors see in this a possible source of coinfections and of the variety of clinical pictures observed in some patients (Adelson et al., 2004). Babesiosis is caused by a parasite, not a bacterium, and calls for a different treatment. Ticks themselves react to radiofrequency radiation: in the laboratory, *Ixodes ricinus* ticks, the main vector of Lyme disease in Europe, move toward an area exposed to 900 MHz, and do so even more when they are infected with *Rickettsia* (Frątczak et al., 2020; Document 6, Section 4.5).

In practice. Depending on the patient’s history—tick bite, stay in an endemic area, erythema migrans—the exclusion workup (Section 6) includes testing for Lyme disease and its coinfections. For the same reason, in a patient whose symptoms persist after treated borreliosis, the question of exposure to waves deserves to be asked. Multiple sclerosis poses the reverse problem: its symptoms

resemble those of electro-hypersensitivity, and a patient whose disorders depend on exposure may wrongly receive this diagnosis, on the strength of nonspecific MRI abnormalities, as long as the question of exposure is not raised (Document 8, Section 6).

6. Examining

All the doctrines agree on one point: look for and treat any other condition that could explain the symptoms. WHO recommends “a medical evaluation to identify and treat any specific conditions” (WHO, 2005). A normal routine workup is to be expected and rules nothing out: “Normal results on these tests must not lead to ruling out harm from electromagnetic fields” (Collective, 2020, p. 11).

6.1 A Measured Biological Feature: The DEMETER Study

One result stands out, because it comes from a public research team and does not rest on what patients declare. In Lyon, in a study funded by Anses and by the Investments for the Future program, Inserm joint research unit 1296 took a skin sample from 26 adult volunteers who described themselves as electro-hypersensitive, cultured its fibroblasts, and applied its clinical radiobiology protocol to them. All the cell lines show the same delay: after irradiation, the ATM protein, which triggers the recognition and repair of DNA breaks, reaches the nucleus more slowly than in radioresistant individuals. The authors write: “By applying X-rays, all the DEMETER cell lines (26/26) appeared characterized by delayed radiation-induced ATM nucleoshuttling (RIANS)” (Sonzogni et al., 2025). According to the laboratory’s earlier literature, radioresistant individuals, by contrast, represent about 75% to 85% of the population (Document 8, Section 5.2).

The biological data were acquired before the sealed questionnaires were opened, and the two sets of data were analyzed separately. Each distinguishes two groups of donors, and these groups coincide for 64% of donors. The cells also show spontaneous DNA breaks, a sign, according to the authors, of internal oxidative stress; in the laboratory, an antioxidant treatment applied after an oxidative insult reduces their traces. In the questionnaires, symptom intensity rises sharply from 300 MHz and peaks between 300 MHz and 3 GHz, a band that includes mobile telephony and 2.4 GHz Wi-Fi; one of the two groups reacts more to lower frequencies and to other agents, such as certain household products (Sonzogni et al., 2025).

The authors derive from this a preliminary molecular model, which links electro-hypersensitivity to the management of DNA breaks, and they themselves set out its limitations: a patient who shows this delay is not necessarily electro-hypersensitive; the cohort is small, which they attribute to the difficulty these patients have in traveling, while considering that a larger cohort would not have radically changed the conclusion; the volunteers belong to the same association; the controls come from an earlier collection of the laboratory; the test uses X-rays, not radiofrequency; and these results, obtained on cultured cells, call for further studies (Sonzogni et al., 2025). The study therefore does not demonstrate that radiofrequency acts through this mechanism; it shows that these volunteers share a measurable biological feature.

6.2 The ARTAC Markers

The ARTAC team, which follows more than 2,000 cases in Paris, reports the following proportions of out-of-range values in the electro-hypersensitive (Belpomme and Irigaray, 2020):

Marker, in blood	Normal value	Out-of-range cases
Histamine	≤ 10 nmol/L	37%
High-sensitivity C-reactive protein	≤ 3 mg/L	15%
Total IgE	≤ 100 IU/mL	22%
Heat shock protein Hsp27	≤ 5 ng/mL	25.8%
Heat shock protein Hsp70	≤ 5 ng/mL	18.7%
S100B protein	≤ 0.105 μ g/L	14.7%
Nitrotyrosine	≤ 0.9 μ g/mL	29.7%
Anti-O-myelin antibodies	absent	22.8%

The authors regard histamine as the most useful marker in practice: “Among biological markers, histamine in the blood is presently the best available marker in the case of no associated allergy and the easiest to measure routinely in medical practice” (Belpomme and Irigaray, 2020). They add, in 24-hour urine, the ratio of 6-hydroxymelatonin sulfate, a breakdown product of melatonin, to creatinine, which the 2020 guide also adopts (Collective, 2020, p. 11). In their 2024 article, which covers 2,018 cases, urinary 6-hydroxymelatonin sulfate is decreased in 86% to 92% of patients and histamine increased in about 30%; with seven markers, 76% to 86% of cases could be objectively characterized, and repeated measurement of S100B protein would serve to monitor relapses (Irigaray et al., 2024). The proportions therefore vary from one publication to another. The authors note that not all the assays were performed in all patients, several of them not being reimbursed in France (Irigaray et al., 2024).

These markers have limitations, which their authors themselves set down: “none of our biomarkers are per se specific” (Belpomme et al., 2015), and “these biochemical tests remain to be reproduced by other laboratories” (Irigaray et al., 2024). In 2018, Anses judged these results “to be considered as preliminary results, to be interpreted with the greatest caution” (Anses, 2018). They do not identify the cause of the disorders; they document, in a given patient, an inflammatory, oxidative, or nitrosative state, and its course as exposure decreases (Document 8, Section 5.1).

6.3 The Guideline Workups

The Austrian and European guidelines propose a broader workup, without thresholds of their own, to be interpreted as a whole: in morning urine, adrenaline, noradrenaline, dopamine, and serotonin; in morning or 24-hour urine, 6-hydroxymelatonin sulfate; in saliva, cortisol at 8 a.m., noon, and 8 p.m.; in blood, a complete blood count, blood glucose, glycated hemoglobin, and TSH, then, depending on the case, markers of oxidative and nitrosative stress—nitrotyrosine, malondialdehyde, glutathione—and of inflammation—high-sensitivity C-reactive protein, interleukins, TNF-alpha—as

well as histamine and vitamin D (Österreichische Ärztekammer, 2012; Belyaev et al., 2016). EUROPAEM does not set thresholds: in its view, several values close to the limits of the normal range can be significant together (Belyaev et al., 2016).

6.4 In Practice

The exclusion workup remains the priority. The markers, if prescribed, document a state and its course; normal results rule nothing out, and the criterion adopted by the 2020 guide remains the improvement of symptoms when exposure ceases (Section 7).

7. Reducing Exposure

For the second doctrine (Section 3), this is the first measure; the 2020 guide also makes it the best diagnostic criterion: “the improvement, or even the disappearance, of symptoms after a prolonged cessation of exposure” (Collective, 2020, p. 11). EUROPAEM states that simple measures can help to alleviate health problems within a few days or weeks (Belyaev et al., 2016). To our knowledge, these measures pose no physical risk; the SFST nevertheless considers that avoidance risks locking the patient into a vicious circle of isolation (SFST, 2023). The simplest measures concern household sources, which are also the closest to the body, particularly at night. In our experience, they are of value above all as prevention, for all the occupants of the home and before sensitivity sets in: at an advanced stage, they are no longer enough, because the antennas remain (see the end of this section):

- connect computers and printers by cable, which the 2020 guide calls “reconnecting in wired mode” (Collective, 2020, p. 12), and unplug Wi-Fi access points or have the router’s Wi-Fi deactivated (Belyaev et al., 2016)—failing that, turn it off at least at night;
- reserve the cell phone for short calls, using the speakerphone or a hands-free kit, avoid keeping it close to the body, and leave it in airplane mode as much as possible (Belyaev et al., 2016), particularly at night;
- prefer a corded landline phone, as recommended by EUROPAEM (Belyaev et al., 2016); failing that, a cordless phone in ECO mode, whose base, without this mode, transmits even when idle, and keep the base at least 50 cm from places of rest (FOPH, 2016);
- avoid wireless devices—headsets, baby monitors, game consoles, keyboards, mice—and, if the exposure comes from outside, choose the room farthest from the source for sleeping (Belyaev et al., 2016).

Measuring exposure is not within the physician’s competence, as the SFST points out; EUROPAEM entrusts it to trained specialists (Belyaev et al., 2016). In our experience, it is nevertheless in the patient’s interest to have a reliable measuring device of his or her own, to locate the sources in the home; a basic model costs about €250. EUROPAEM also calls for products claimed to neutralize electrosmog to be assessed with great restraint. Finally, the patient can do nothing about outside sources—a nearby antenna, the small cell on the street, the neighbors’ Wi-Fi, the building’s meter—and it is these sources that, at an advanced stage, make household measures insufficient. For severe

forms, the 2020 guide considers protecting oneself from them “or moving” ([Collective, 2020](#), p. 12): this is why reducing exposure at the source and preserving white zones are matters of public policy, not of the medical office alone (Documents 5, 7, and 8).

8. Receiving Patients in the Medical Office and the Hospital

The 2020 guide recommends, in a waiting room, a medical office, or a hospital, to “reduce all exposure to electromagnetic waves to a minimum” and to limit the duration of exposure: turn off Wi-Fi, Wi-Fi scanning, and Bluetooth on computers and tablets; turn off cell phones, which keep transmitting in standby mode, and ask the patients present to do the same; keep the patient away from electrical sources; allow the patient to wait in a less exposed area ([Collective, 2020](#), p. 13). In the United States, the U.S. Access Board states that, under the Americans with Disabilities Act and other disability laws, public and commercial buildings must provide reasonable accommodations for individuals with chemical or electromagnetic sensitivities, and, among the accommodations it lists as possible at the patient’s request, includes requiring that cell phones and computers be turned off; the page, which is undated, is part of the research section of the agency’s website and does not state its regulatory status ([U.S. Access Board, 2026](#)). Scheduling the appointment at an off-peak time, or seeing the patient without a wait, further reduces the duration of exposure; this is our own suggestion, not a published recommendation.

9. Documenting

- **Record, visit after visit**, the relationship between the symptoms, time, and place, their course away from the sources, and the diagnoses ruled out. This is the best clinical documentation available.
- **Code**. In the absence of a dedicated code, EUROPAEM proposes coding the symptoms, then R68.8 (“Other specified general symptoms and signs”) with Z58.4 (exposure to radiation) in ICD-10 ([Belyaev et al., 2016](#)), which correspond to MG4Y and QD70.4 in ICD-11 (Document 4, Section 3.2).
- **Certify**. Positions diverge. In France, a note from the Directorate General for Health dated May 26, 2014, leaves the issuance and content of certificates “to the physician’s discretion, case by case” (cited by [Collective, 2020](#), p. 12); the SFST considers that “under no circumstances should a physician write on a certificate that he or she observes, or even confirms, a situation of EHS,” the physician being able to certify that he or she follows the patient and to report what the patient describes ([SFST, 2023](#)). A court of appeal based its decision on certificates spanning several years, which described the symptoms, their relationship to exposure, and the other diagnoses ruled out; the general objections concerning the absence of harmfulness and compliance with the thresholds “have no bearing on this finding of an individual impact on health” ([Riom Court of Appeal, 2025](#)).

10. Referring

- **To a specialized consultation** in occupational and environmental medicine: in France, the regional centers for occupational and environmental diseases see these patients, at their own request or at the request of their attending physician or occupational physician (Sénat, 2025).
- **To disability services**, which can take into account the consequences of the health condition “regardless of the diagnostic label” (Sénat, 2025); in the United States, to the accommodations provided for by the Americans with Disabilities Act (U.S. Access Board, 2026).
- **At work**: the 2020 guide mentions sick leave, contact with the occupational physician, workstation adjustment, and part-time return to work (Collective, 2020, p. 12).
- **Preserve the relationship**. The SFST itself describes “The breakdown of the therapeutic relationship with the medical profession” as “a major danger” (SFST, 2023); Anses considered it “above all essential to establish and preserve a climate of trust” (Anses, 2018).

11. Discussion

The primary care physician can neither settle the scientific question nor reduce exposure outside the patient’s home. The physician can, however, listen, rule out other causes, document the relationship between the symptoms and exposure, advise the simple measures that pose no known physical risk, and adapt his or her own office. Federal information that gave the physician only the WHO conclusion—the absence of a scientific basis for a link—would leave the physician without tools when facing a patient whose symptoms, according to WHO itself, are real. The pointers above show that care is possible before science has settled the question.

12. Limitations

These pointers are not a validated clinical practice guideline: they report published positions that diverge, and most of the sources are European. The biological markers cited have not been validated: those of ARTAC come from a single team and a single laboratory, and their proportions vary from one publication to another; the Inserm study covers 26 volunteers from the same association and a test using X-rays, not radiofrequency. The connection with Lyme disease rests on the resemblance of the clinical pictures, on a hypothetical mechanism, and on our experience: to our knowledge, no study has examined it. Exposure-reduction measures are recommended by some guidelines, without, to our knowledge, any controlled trial of their effectiveness (Document 8, Section 9).

13. Recommendations (Question 9)

1. Provide primary care physicians with brief information, prepared by a group independent of industry that includes clinicians who follow electro-hypersensitive patients, covering the points of this document: what is known and what is not known, the relationship between the symptoms, time, and place, the associated diseases, including Lyme disease and its coinfections,

the exclusion of other causes, simple exposure-reduction measures, receiving patients, documentation, and referral.

2. Give physicians, for their patients, access to exposure data: a public map of transmitters and their measurements (Document 3), and home measurements carried out by trained specialists, at no cost to the patient.
3. Inform health professionals and the public about the behavior of household devices—a phone that transmits when no call is in progress, a DECT base that transmits when idle, Wi-Fi that is always on—and about the measures that reduce exposure, particularly at night.
4. Make medical offices and health care facilities accessible to the electro-hypersensitive, and accompany the information given to physicians with a reduction of exposure at the source throughout the entire territory, the preservation of the white zones that remain, and the recreation of others—measures without which the advice given in the medical office would remain without effect.

Glossary

Term	Meaning
6-hydroxymelatonin sulfate	Breakdown product of melatonin, the sleep hormone, excreted in urine; its measurement reflects melatonin production.
ADA	Americans with Disabilities Act: U.S. federal law of 1990 on the rights of individuals with disabilities.
Anses	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (French Agency for Food, Environmental and Occupational Health & Safety): French public body, under the supervision of five ministries, responsible for health risk assessment.
ARTAC	Association pour la recherche thérapeutique anti-cancéreuse (Association for Research and Treatments Against Cancer): French association, founded by the oncologist Dominique Belpomme, which has followed a cohort of electro-hypersensitive patients since 2009.
Babesiosis	Infection caused by a blood parasite, <i>Babesia</i> , transmitted by ticks; in the United States, mainly <i>Babesia microti</i> .
Biomarker	Measurable biological parameter, in blood, urine, or a tissue, that provides information on a state or a process of the body.
Bluetooth	Short-range radio link between devices, around 2.4 GHz.
Chronic fatigue syndrome	Illness marked by intense and lasting fatigue that rest does not relieve and that exertion worsens; also called myalgic encephalomyelitis.
Cognitive behavioral therapy	Psychotherapy that aims to modify the thoughts and behaviors associated with a disorder.
Coinfection	Simultaneous infection by several pathogens, for example transmitted by the same tick.

Term	Meaning
DECT	Standard for household cordless phones, around 1.9 GHz; the base transmits even when idle, except in ECO mode.
ECO mode	Mode of DECT cordless phones in which the base stops transmitting, or transmits only very weakly, when no call is in progress.
Electro-hypersensitivity, electrosensitivity	Electrosensitivity refers to a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; electro-hypersensitivity, to its highest degrees. We regard it as a syndrome, not as a disease (see Document 4, Section 3.1).
Electrosmog	All the artificial electromagnetic fields to which a human being is exposed at a given moment.
Erythema migrans	Red patch that spreads around the site of the tick bite, a characteristic sign of the early stage of Lyme disease; it may be absent.
EUROPAEM	European Academy for Environmental Medicine, which in 2016 published a guideline on the prevention, diagnosis, and treatment of disorders related to electromagnetic fields.
Fibroblast	Connective tissue cell; skin fibroblasts are easy to culture and are used for radiosensitivity tests.
Fibromyalgia	Syndrome of chronic widespread pain, accompanied by fatigue, sleep disorders, and cognitive disorders.
Heat shock proteins (Hsp27, Hsp70)	Proteins produced by cells in response to stress.
High-sensitivity C-reactive protein	Sensitive assay of a protein produced by the liver during inflammation.
Histamine	Molecule released in particular by mast cells, involved in inflammation and allergy.
ICD-10, ICD-11	WHO International Classification of Diseases, tenth and eleventh revisions.
IgE	Immunoglobulin E: antibodies involved in allergic reactions.
Inserm	Institut national de la santé et de la recherche médicale (French National Institute of Health and Medical Research); French public body for biomedical research.
Lyme disease	Infection caused by bacteria of the <i>Borrelia burgdorferi</i> group, transmitted by ticks of the genus <i>Ixodes</i> ; also called Lyme borreliosis.
Mast cell	Immune system cell, present in the skin and mucous membranes, that releases histamine and other mediators of inflammation.
MRI	Magnetic resonance imaging: imaging technique that shows, among other things, lesions of the brain and spinal cord.
Multiple chemical sensitivity	Syndrome of symptoms affecting several organs upon exposure to various chemical substances at concentrations well below those that affect the general population.
Myelin	Sheath that surrounds nerve fibers and speeds up the conduction of nerve impulses.

Term	Meaning
Nitrotyrosine	Marker of nitrosative stress, produced by the action of peroxynitrite on proteins.
Provocation study	Experiment in which a subject is exposed, blind, to a real or sham field, and what the subject perceives or feels is recorded.
Radiosensitivity	Increased sensitivity of an individual or of their cells to ionizing radiation.
Regional centers for occupational and environmental diseases	Centres régionaux de pathologies professionnelles et environnementales: French hospital consultations specializing in work-related and environment-related diseases; they feed the national vigilance network coordinated by Anses.
Rickettsia	A bacterium of the genus <i>Rickettsia</i> , transmitted notably by ticks, which causes spotted fevers.
S100B	Protein produced mainly by the glial cells of the nervous system, used as a marker of brain damage.
SFST	Société française de santé au travail (French Society of Occupational Health): learned society of occupational medicine and occupational health.
Small cell	Low-power, short-range antenna installed close to the ground, on street furniture or building facades, and connected to the operator's network like a base station; "small-area wireless access point" in European Union law (see Document 5, Section 4.1).
Tick	Parasitic acarid that feeds on the blood of vertebrates and transmits many pathogens; <i>Ixodes ricinus</i> in Europe and <i>Ixodes scapularis</i> in the eastern United States transmit Lyme disease.
TNF-alpha	Tumor necrosis factor alpha: a cytokine, that is, a signaling molecule, involved in inflammation.
U.S. Access Board	U.S. federal agency responsible for accessibility rules for individuals with disabilities.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).
WHO	World Health Organization.
Wi-Fi	Wireless local area network, around 2.4, 5, and 6 GHz.

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Electro-Hypersensitivity Does Not Exist

In Conclusion

On reading the studies and analyses gathered in these nine documents, there is more than a reasonable doubt as to the safety of man-made electromagnetic radiation.

The authorities knew.

As early as 1953, a medical report from an American aircraft manufacturer described, among the crews working near radar equipment, cancers, internal bleeding, and widespread headaches, and the U.S. Navy launched research. In 1971, a bibliography from its medical research institute listed more than 2,000 studies on the biological effects of microwave and radiofrequency radiation; its 1977 update listed more than 4,600. From 1976 to at least 1987, the Office of Naval Research circulated summaries of Soviet research, which described effects on the nervous and endocrine systems at levels below the U.S. limit of the time ([Scarato, 2025](#)). In 2011, the Parliamentary Assembly of the Council of Europe called for areas not covered by wireless networks to protect the electro-hypersensitive (Document 1), and the International Agency for Research on Cancer, an agency of the World Health Organization, classified radiofrequency radiation as possibly carcinogenic ([IARC, 2011](#)). In 2014, the U.S. Department of the Interior considered that the FCC's standards rested on a criterion "now nearly 30 years out of date" (Document 6). In 2018, the U.S. National Toxicology Program study found heart tumors in rats, "clear evidence of carcinogenic activity," and the Ramazzini Institute found the same type of tumor at a level close to the limit applicable to the public (Document 2). In 2021, a federal court held the FCC's decision to retain its limits arbitrary (Document 6). In 2025, a systematic review commissioned by the World Health Organization itself concluded, with a high level of certainty, that the risk of cancer increases in exposed animals (Document 2). The networks have nevertheless been deployed, then densified, and still are.

Professionals knew as well.

Eight years ago, my father, then over eighty years old, asked me to install an office suite on a laptop connected through a mobile phone card. I told him I was not able to, because I could not tolerate the waves emitted by these devices. He answered: "I understand." I later found the instruments my father owned for measuring high-frequency electromagnetic waves; he was an electronics professional, and they were the older models of the ones I use today. I conclude that he had known for more than thirty years that high-frequency waves are harmful. He was not the only one: I have since had occasion to speak with other professionals in that industry, including antenna riggers.

And this raises the question of consent.

The exposure limits applied in France and in most European countries rest on a single mechanism, the heating of tissue (Document 2); health assessment, including that of Anses, has not led to their revision. Yet, as human beings, we are sovereign over our bodies; nothing is authorized to enter

them without our consent. French law states it in these terms: “Everyone has the right to respect for their body. The human body is inviolable” (Civil Code, art. 16-1; [French Republic, 1994](#)). Wireless networks permanently expose entire populations to signals whose biological effects were documented before their deployment, and have been documented ever more fully since (Documents 2, 5, and 7). Yet neither the public nor health professionals have been informed of what was known (Document 8). And if the exposure of populations to high-frequency waves is not presented as an experiment, it nevertheless has its characteristics: a new agent, applied to human beings, without their consent.

The first principle of the Nuremberg Code states that “The voluntary consent of the human subject is absolutely essential,” and its ninth principle provides that the subject may bring the experiment to an end ([Nuremberg Military Tribunals, 1949](#)). HHS itself applies this requirement: its regulation for the protection of human subjects, known as the “Common Rule,” requires that the informed consent of the subject be obtained before involving the subject in research conducted or supported by the federal government (45 CFR 46.116; [HHS, 2018](#)). For our part, we never consented to serve as experimental subjects, nor to be exposed. And when one of us gave an operator clear notice of his refusal to be exposed, in connection with the installation of a new antenna (ORANGE), the operator disregarded it by filing a new installation application without any prior communication to the individual concerned.

What is being inflicted on us is unacceptable.

We had to leave our country, then change where we live as the antennas spread. The white zones where the electro-hypersensitive found refuge are disappearing one after another, and coverage policy aims to make them all disappear (Documents 1 and 5). We are not the only ones: other electro-hypersensitive individuals, more and more numerous, testify to this.

It is, in the end, a primitive technology.

To carry information to a device, it continuously broadcasts energy throughout the whole space in between, and imposes it on everything there—human beings, animals, plants. Its safety rests on a single mechanism, the heating of tissue, drawn from experiments conducted in the 1980s on five monkeys and eight rats (Document 2). It can measure what it produces only at a single point and at a single moment (Document 3). And yet, for fixed uses, cable and optical fiber provide the same services without radiation (Document 5).

There is still time to choose another path: recognize the harm suffered by all populations, reduce exposure at the source throughout all territories, preserve the white zones that remain and re-create others, and, at the very least, return to recognizing everyone’s right to refuse to be exposed. This right exists and is inalienable. It would seem that, somewhere along the way, it has been forgotten.

Electro-hypersensitivity exists too, and if it does not exist, it is for lack of recognition.

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Quotations from French sources are our translations; the original wording appears in the French version of this document.

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