ADDITIONAL 5 · NATIONAL PROGRAM

National Program for the Review of Research Criteria in Electromagnetic Hypersensitivity

A proposal to revise how studies of electromagnetic hypersensitivity are designed and interpreted, with objective endpoints, a clinical pathway and tinnitus as a defined outcome

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Letters Request letter by J. Joaquín Machado, made with Dr. Robert Marshall Leal Lue, PhD in clinical psychology, Dr. Pilar Muñoz-Calero and other specialists, 21 October 2026; supporting letters by Dr. Pilar Muñoz-Calero, MD, President, Fundación Alborada, Madrid, 8 October 2026, and Dr. Luis M. Valdés, physician and audiologist, 21 October 2026

For consideration by the U.S. Department of Health and Human Services and the agencies named in Part 11

Initial program period 24 months

RFI questions addressed 4(h) to 4(j), 4(l), 4(m), 5(o), 10(a), 10(d) to 10(f), 11(f), 11(g), 16, 17(a) to 17(c) and 18

Evidence grades (a) peer-reviewed, standards body, clinical practice guideline, court or regulatory record; (b) institutional report, agency guidance, preprint, working paper or thesis; (c) manufacturer, advocacy, media source or supporting letter

21 October 2026

Relationship disclosure. EFEIA operates within the NOXTAK Corporation ecosystem. The author is EFEIA's Founder and Director and also NOXTAK's founder and CTO; NOXTAK develops electromagnetic hygiene products. The letters S1, S2 and S3 are submitted as received; Dr. Valdés co-authors with the author the tinnitus series cited as S4. The 2014-2018 cohort in Part 4, followed with Dr. Robert Marshall Leal Lue, evaluated a NOXTAK product among concurrent interventions S5, and the EFEIA Differential Diagnosis Protocol originated in research within the NOXTAK project. This proposal evaluates no product, and Part 8 asks that the program evaluate none. Sources S6 to S10 are EFEIA documents.

REQUESTED ACTION

Convene an independent, publicly funded review of the criteria used to design and interpret studies of electromagnetic hypersensitivity, and support a 24-month program that publishes revised research criteria, including stratification of participants by conditioned response and physiological sensitization, a clinical assessment pathway with professional training, a consented clinical registry with tinnitus and sound intolerance as defined outcomes, and a blinded multi-site replication of the biological markers reported to date.

Executive Proposal

We propose a national program to review the criteria with which studies of electromagnetic hypersensitivity (EHS, also termed idiopathic environmental intolerance attributed to electromagnetic fields, IEI-EMF) are designed, evaluated and interpreted, and to give the people who report it a documented clinical pathway. The request is made in the author's letter, together with Dr. Robert Marshall Leal Lue, PhD in clinical psychology, Dr. Pilar Muñoz-Calero and other specialists, and two physicians support it with letters of their own: a specialist who has practiced environmental medicine for 25 years and treats patients with EHS and related sensitivities, and a physician and audiologist who has observed tinnitus onset or escalation in patients whose histories include prolonged proximity to electrical and wireless devices. [S1-S3]

The current scientific position has three elements, and this proposal accepts each as a description of the existing record. WHO states that EHS symptoms are real and can be disabling, that EHS has no clear diagnostic criteria, and that there is no scientific basis to link the symptoms to electromagnetic field (EMF) exposure. [R1] A 2010 systematic review of 46 blind or double-blind experiments with 1,175 volunteers found no robust evidence that EMF triggers the symptoms. [R2] A 2024 WHO-commissioned review of 41 studies with 2,874 participants found that people with IEI-EMF were no better than others at determining when they were exposed. [R3]

Those studies tested a narrower question than the conclusion often drawn from them. Most measured conscious detection of a field, or symptoms reported during or soon after short laboratory exposures. [R2, R3] A systematic review of 28 provocation studies found selection bias in 82% of them; in 57%, exposure duration and assessment times were not matched to each participant's reported symptom latency. The review concluded that the evidence points towards no effect of exposure and that, if effects exist, they must be very weak or affect only a few individuals. [R4] The 2024 review looked for particularly vulnerable individuals and found no evidence of them, and several studies tested participants one by one. [R3, R5, R6] Most, however, did not match assessment times to each participant's reported latency, and a design that cannot detect a response appearing hours later cannot rule it out.

The program has six components: revised design criteria; objective physiological endpoints defined in advance; phenotyping and stratification of participants, including multiple chemical sensitivity, sleep disruption, tinnitus and the degree of conditioned response; a blinded multi-site replication of the biological markers reported to date; a clinical assessment pathway with professional training; and governance free of conflicts of interest. It does not presume that EMF causes EHS. It asks for studies able to detect an effect in a subgroup if one exists, and able to show its absence convincingly if it does not.

Meaning of the request. This is not a request to set aside negative findings or to declare a causal relationship. It asks that the next generation of studies address the question patients and clinicians raise: whether some people respond physiologically to the exposures of their daily environment, over the time scales on which they report responding.

1 What the Current Evidence Establishes

Findings this proposal accepts

WHO describes EHS as a set of non-specific symptoms that differ from person to person and can vary widely in severity. Whatever its cause, WHO states, EHS can be a disabling problem for the affected individual. [R1] A 2005 review of 31 experiments with 725 participants found no evidence of a biophysical hypersensitivity in 24; the positive results of the other 7 were not replicated, appeared to be statistical artefacts or were mutually incompatible. [R7] Its 2010 update to 46 experiments and 1,175 volunteers supported a role for the nocebo effect. [R2] The 2024 WHO-commissioned review reached a consistent conclusion. [R3]

Designs centred on the individual have produced the same overall picture, with informative exceptions. None of 42 participants tested at home with personalized signal type, strength and duration identified exposure better than chance. [R5] In a co-designed protocol of 12 sessions, perception and symptoms did not follow real exposure except in one volunteer, whose perception mostly matched it; for half of the volunteers, symptoms followed perceived rather than real exposure, which the authors read as support for a nocebo hypothesis. [R6] Over three weeks of body-worn exposimetry, symptom scores correlated with radiofrequency (RF) peaks or rate of change in 4 of 7 participants, positively in two and negatively in two, and with the time-weighted average in none. [R8]

What the studies were designed to test

The dominant outcomes in this literature have been conscious detection of a field and symptoms reported during or soon after short laboratory exposures. [R2, R4] They answer whether a person can perceive an exposure and whether symptoms follow it promptly. They do not answer whether exposure changes physiology without being perceived, or whether a response appears hours or days later, which is the pattern described by clinicians who treat these patients. [S2]

WHO itself noted, in its advice to researchers, that some studies suggest certain physiological responses of people with EHS lie outside the normal range, in particular central nervous system hypersensitivity and autonomic imbalance, and that these should be followed up in clinical investigations. [R1] A double-blind provocation study of one physician with self-reported EHS found that a 60 Hz electric field averaging 300 V/m over the head was followed within 100 seconds by temporal pain, headache, muscle twitching and skipped heartbeats, driven mainly by field transitions, although she could not report the field's presence more often than under sham. [R9] It is a single case, its outcomes were mainly somatic reactions, and it requires replication. It suggests that, in this subject, perception of the field and somatic response diverged.

A question some reviewers consider open

Some reviewers consider the question open. A critical review of explanatory hypotheses found that none of the electromagnetic, cognitive or attributive hypotheses is fully satisfying, and called for research able to decide between them. [R10] A review of individual sensitivity judged the existing studies too poor in quality to establish or rule out a causal link, and proposed combining provocation with transcriptomic and proteomic measures in place of feelings-based outcomes. [R11]

Required output. A statement, prepared by the independent review, of what existing provocation studies can and cannot exclude: which exposures, time windows, outcomes and participant groups they tested, and which they did not.

2 Design Limitations Identified in the Literature

Dr. Muñoz-Calero's letter lists five recurrent features of provocation studies: exposures lasting minutes, insufficient washout periods, participants grouped without clinical or biological phenotyping, sham exposures conducted with background fields present, and conscious perception as the primary outcome. [S2] A systematic review of methodological limitations in 28 studies with 1,540 participants allows most of these to be checked against the record. [R4]

Exposure duration and delayed responses

In 16 of the 28 studies (57%), exposure duration and assessment times were not matched to each participant's symptom latency. [R4] Across 63 studies, one of the four most frequent identifying criteria for IEI-EMF was that symptoms occur soon after perceiving an exposure source or exposed area, within up to 24 hours. [R12] Clinicians report delayed reactions and recovery periods of hours or days. [S2] A protocol that measures outcomes only within the session excludes that pattern by design.

Washout and order of exposures

The review judged that intervals between sessions were probably long enough to prevent sequence effects in most studies. The more frequent weakness was order: 12 studies (43%) departed from counterbalancing without controlling for period effects. [R4] Clinicians report recovery periods of hours or days and consider the washout periods of many studies insufficient. [S2] Washout should therefore be set to each participant's reported recovery time and verified by a return to baseline.

Who is studied

Selection bias was found in 23 of the 28 studies (82%). Eight (29%) did not screen for somatic or mental disorders that could explain the symptoms, and 18 (64%) did not verify how strongly each participant's symptoms differ with and without exposure. [R4] The identifying criteria themselves vary: a review of 63 studies found considerable heterogeneity and called for consensus criteria and a validated screening tool. [R12] Pooling participants with different clinical pictures dilutes any effect confined to a subgroup.

Sham conditions and blinding

Twenty-six of the 28 studies (93%) described themselves as double-blind; in 7 (25%), blinding was judged possibly ineffective. [R4] A sham session compares the test source against whatever background remains when it is off. Clinicians report sham exposures conducted with background fields present. [S2] Protocols should measure and report that background across RF, 50/60 Hz and 2 to 150 kHz bands, so that sham and active conditions can be compared in physical terms, [R13] and should record participants' and assessors' guesses about the condition.

Outcomes and statistical power

Twenty-one studies (75%) gave no estimate of statistical power, and 12 (43%) did not adjust for multiple comparisons. [R4] The outcomes used have been mainly symptoms and detection, which depend on perception and are open to expectation in either direction. Objective endpoints defined in advance are needed alongside them. [R11]

Source of funding

Among 59 experimental studies of mobile phone exposure, those funded exclusively by industry were the least likely to report a statistically significant result, with an odds ratio of 0.11 (95% CI 0.02 to 0.78) against studies funded by public agencies or charities. [R14] Funding source and investigators' interests should be reported and weighed for every funder, including organizations such as the proponent's.

What the methodological review concluded

Studies reporting effects and studies reporting none had similar limitation profiles. The authors concluded that the evidence points towards no effect of exposure and that, if physical effects exist, they must be very weak or affect only a few individuals. They recommended individual-level designs, identification of subgroups and reduction of bias and imprecision. [R4] Those recommendations are the basis of the criteria in Part 6.

> **Required output.** An audit of existing provocation studies against the revised criteria, published with the rating of each study, so that HHS can see which questions the existing record has tested.

3 Biological Findings That Require Independent Replication

Several research groups report biological differences in people with EHS. None is yet a validated diagnostic marker, and the largest series had no concurrent control group. They are reasons to test, not conclusions.

Markers reported in clinical series

A French series investigated 1,216 consecutive self-reporting cases from 2009. Among 727 evaluable cases of 839 enrolled, 521 (71.6%) had EHS alone, 52 (7.2%) multiple chemical sensitivity (MCS) alone and 154 (21.2%) both. Raised histamine was reported in nearly 40%, nitrotyrosine in 28%, S100B protein in 15%, anti-O-myelin autoantibodies in 23% and heat shock proteins 27 and/or 70 in 33%. [R15] Drawing on more than 2,000 cases, the same authors later reported that EHS was associated with MCS in 30% of cases; in a subset of 32 patients, about 80% had one to three raised oxidative stress biomarkers. [R16]

An Italian study of 153 people with EHS, 147 with MCS and 132 healthy controls found lower erythrocyte glutathione S-transferase activity, lower reduced glutathione and a higher oxidized-to-total coenzyme Q10 ratio in EHS than in controls. Combined deletion of the GSTM1 and GSTT1 genes was found in 13% of EHS participants tested against 1.5% of controls (odds ratio 9.7, 95% CI 1.3 to 74.5). [R17] A German case-control study of 89 EHS patients and 107 matched controls found poorer discrimination of real from sham magnetic stimulation and age-dependent changes in intracortical

facilitation, alongside EMF-related cognitions, and interpreted them as signs of higher individual vulnerability. [R18]

Overlap with other sensitivities

Clinicians report that EHS frequently overlaps with MCS, fibromyalgia and chronic fatigue syndrome in the same patient, and Dr. Muñoz-Calero places EHS within the framework of central sensitivity syndromes, a grouping proposed for fibromyalgia and overlapping conditions with shared mechanisms of nervous system sensitization. [S2, R19] A guideline from the European Academy for Environmental Medicine proposes protocols for the diagnosis and treatment of EMF-related health problems. [R20] A review of mechanisms judged them biologically plausible. [R21]

EFEIA's 2025 EHS Global Census points the same way. Among 94 participants who completed all three questionnaires, symptom scores correlated with sleep disruption ($r = 0.638$) and with sensitivities beyond EMF ($r = 0.465$) more strongly than with exposure habits ($r = 0.413$), and the analysis described eight profiles split by sensitivity burden. These are cross-sectional, self-selected and self-reported data; they support phenotyping, not causal inference. [S6]

Expectation must be measured, not assumed

Expectation can produce symptoms. In an experiment with 147 participants, 82 attributed symptoms to a sham Wi-Fi exposure, and a television report on Wi-Fi health effects increased worry and, among anxious participants, symptoms after sham exposure. [R22] Interviews with 40 people with EHS found that symptoms appeared before any suspicion of EMF, which does not fit a purely nocebo origin, while nocebo responses may reinforce the attribution later. [R23] In a second experiment with 65 healthy participants, a sensational television report increased the perceived intensity of mild electrical stimuli during sham Wi-Fi exposure, most strongly in those who tend to notice bodily sensations intensely. [R24] Both mechanisms should be measured in every study, and neither should be assigned to a patient by default.

> **Required output.** A blinded, multi-site replication of candidate markers (histamine, nitrotyrosine, S100B, heat shock proteins, anti-myelin autoantibodies, the glutathione system, the coenzyme Q10 ratio and GSTM1, GSTT1 and CYP2C19 genotypes) with case definitions fixed in advance and concurrent controls: healthy people, people with MCS without EHS, and people with other chronic conditions.

4 Conditioning and Sensitization: A Clinical Model to Test

The request letter adds a clinical observation that current study designs do not account for. [S1] It rests on two bodies of experience, both observational. With Dr. Robert Marshall Leal Lue, PhD in clinical psychology, the author followed 357 patients with EHS in Aruba from 2014 to 2018, observing onset, course, relapse and response to environmental and clinical interventions over time; the series was uncontrolled and included a NOXTAK product among concurrent interventions. [S5] Through EFEIA's network of international consultants, including functional medicine physicians, psychiatrists, psychologists, audiologists and other health professionals, the author has reviewed or directly observed more than 1,500 cases of EHS. This is an author-reported count, not a prevalence estimate or a set of independently adjudicated cases. [S1]

Three components in the same patient

In this experience EHS behaves neither as a purely psychological phenomenon nor as a simple dose-response toxicity, but as a sensitized and partly conditioned stress response of a susceptible organism. [S1] Three components are described. First, physical distress tends to come before attribution to EMF, consistent with the qualitative finding that symptoms preceded any suspicion of EMF. [R23] Second, after episodes in which a real exposure coincided with genuine physiological distress, many patients develop hypervigilance, anticipatory autonomic activation, avoidance and symptom amplification in response to cues such as the sight of an antenna, a router light or the knowledge that a device is present, even when the emitter is switched off. This is consistent with established models of interoceptive learning and symptom perception. [S1, R25] Third, symptoms may persist or recur without a relevant active exposure, in a self-sustaining state of inflammatory, oxidative and autonomic dysregulation in which the trigger becomes progressively less specific; the author relates this to the limbic kindling model proposed for multiple chemical sensitivity and to the biomarker and central sensitivity literature in Part 3. [S1, R26]

Why this matters for interpretation

When participants are already sensitized and conditioned, short blinded exposures with conscious perception as the endpoint cannot separate the environmental trigger, the physiological sensitization and the learned response. In the author's view this produces a systematic classification bias toward a psychological category, a property of the method rather than a finding about the nature of EHS. As the letter notes, in post-traumatic stress no clinician concludes that the original trauma did not happen because a patient reacts to a harmless reminder; a conditioned reaction to an inactive cue likewise does not demonstrate that the original trigger was inert. [S1] Nocebo responses are real and belong in the picture, as the experiments in Part 3 show. [R22, R24] The proposal is that they be measured in each participant, not used as a diagnosis of exclusion that closes the inquiry.

The EFEIA Differential Diagnosis Protocol

From the 2014-2018 cohort, research led by Dr. Leal Lue within the NOXTAK project established a clinical psychological protocol for estimating the degree of nocebo involvement. EFEIA developed from it its Differential Diagnosis Protocol, now a mandatory part of EFEIA's intake questionnaire across its consultant network. It assesses five elements: the temporal relationship between real exposures and the first episodes of symptoms; the degree of psychological and conditioned involvement, including anticipatory anxiety, hypervigilance, avoidance and trauma-like features; physiological sensitization and overlap with MCS, fibromyalgia and chronic fatigue syndrome; objective markers where available, such as heart rate variability; and the exposure environment, measured rather than assumed. The result is a profile, not a label, estimating how far a case is driven by the environment, by the patient's biological terrain and by conditioning. [S1] The author describes it as preliminary; the program would test its reliability and validity before any use beyond research.

> **Required output.** Validated measures of conditioned response and physiological sensitization, used to stratify participants before provocation testing, so that a learned reaction to a cue is analysed separately from the response to real exposure.

5 Tinnitus and Sound Intolerance as Defined Outcomes

A common and disabling symptom

In the 2007 National Health Interview Survey, 21.4 million U.S. adults (9.6%) reported tinnitus in the previous 12 months; 27.0% had had symptoms for more than 15 years, 36.0% reported near-constant symptoms and 7.2% described their tinnitus as a big or very big problem. [R27]

Overlap with EHS

In a German case-control study, 35 of 69 EHS respondents (50.7%) reported current tinnitus against 14 of 80 controls (17.5%, $p < 0.0001$). Mobile phone use, estimated from billing, did not influence the risk of tinnitus, and the authors proposed a shared pathophysiology involving an overactivated cortical distress network. [R28] Among 113 people with self-reported EHS, 28 (24.8%) attributed tinnitus to mobile or wireless phones, and their noise sensitivity scores were higher than those of 48 controls (63.4 against 51.6, $p < 0.001$). [R29] A French clinical series reported tinnitus in 60% and hyperacusis in 40% of patients with EHS, against 6% of controls for each. [R16]

What is known about exposure and tinnitus

Direct evidence is limited and inconsistent. A matched case-control study of 100 consecutive tinnitus patients found an odds ratio of 1.95 (95% CI 1.00 to 3.80) for mobile phone use of four years or more. [R30] The 2024 WHO-commissioned review of observational studies estimated a relative risk of 1.43 (95% CI 0.94 to 2.18) per 100 minutes of weekly wireless phone call time, with very low certainty. [R31] Both assessed phone use or call time. Neither measured the bedroom exposure, near-source fields or electrical transients that clinicians describe in their patients' histories. [S3]

The clinical observation behind the request

Dr. Valdés reports more patients presenting with abrupt tinnitus onset, or a marked escalation not explained by the history at presentation, some younger than age-related hearing loss would suggest; he describes this as a clinical impression within his practice, not a population incidence estimate. Their histories often include prolonged proximity to powered or transmitting devices: phones and chargers near the head during sleep, wireless equipment beside the bed, electrically powered beds or nearby machinery. In about five years of observational work with dozens of patients, assessed with the Tinnitus Handicap Inventory and audiology including extended high-frequency testing, managing the exposure environment alongside usual care was in selected cases followed by a progressive reduction in tinnitus burden. He describes this as uncontrolled clinical observation that supports a testable hypothesis, not evidence of efficacy. [S3, S4]

His interpretation separates initiation from amplification: an environmental factor may intensify or sustain tinnitus in a sensitized auditory system without having caused the original disorder. [S3] Central gain, the compensatory increase in central auditory activity after a loss of peripheral input, provides one framework in which an added load could raise the prominence of tinnitus. [R32, R33] Whether near-source electromagnetic exposure modulates that system under real living conditions is the hypothesis to test. A companion EFEIA review raises the same question for adolescents who wear in-ear wireless devices for long periods. [S7]

Clinical safety comes first

The 2026 update of the clinical practice guideline on tinnitus recommends a targeted history and physical examination, a comprehensive audiological evaluation, distinguishing bothersome from non-bothersome tinnitus, inquiring about risk of self-harm, education, hearing aid evaluation where indicated, cognitive behavioral therapy and documentation of outcomes; it recommends against antidepressants, anticonvulsants, anxiolytics or intratympanic medications for tinnitus, and against dietary supplements and repetitive transcranial magnetic stimulation. [R34] Sudden hearing loss is a medical emergency. The sudden hearing loss guideline recommends audiometry as soon as possible, within 14 days of onset, and lists corticosteroids within two weeks as an option. [R35, R36] Environmental assessment must never delay that care. [S3]

> **Required output.** A core outcome set for tinnitus in EHS research that distinguishes new onset, exacerbation of existing tinnitus, perceived loudness, distress, functional impact and sound intolerance, measured with validated instruments such as the Tinnitus Handicap Inventory and the Tinnitus Functional Index, together with audiometry and a validated sleep measure. [R37-R39]

6 Proposed Criteria for Future Studies

The criteria in Table 1 turn Parts 2 to 5 into design requirements. They would apply to provocation studies, observational cohorts and intervention trials funded under the program, and would serve as appraisal criteria when HHS weighs the existing evidence.

Table 1. Proposed criteria, by design element.

Element	Reported practice	Proposed criterion
Case definition	Heterogeneous self-report criteria across 63 studies [R12]	Case definition fixed in advance; phenotypes recorded (EHS alone, with MCS, with tinnitus or sound intolerance, sleep-dominant); somatic and psychiatric assessment documented and analysed, not used to label the case by default
Individual response	64% did not verify each participant's symptom contrast [R4]	Each participant's reported response pattern confirmed before testing; repeated, randomized, blinded individual-level crossovers, combined across participants [R8, R5]
Exposure	Acute laboratory exposures; personalized exposure at home rare [R3, R5]	Signals matched to each participant's reported sources (RF, 50/60 Hz, 2 to 150 kHz), in a familiar setting where feasible, for durations that cover reported latency; dosimetry documented [R13]
Timing	57% not matched to symptom latency [R4]	Follow-up windows set to each participant's reported latency, extending into the following days where delayed responses are reported [S2]
Washout and order	43% departed from counterbalancing without modelling period effects [R4]	Washout set to reported recovery and verified by return to baseline; counterbalanced order with period effects modelled
Sham condition	Sham sessions run with background fields present, as clinicians report [S2]	Background RF, 50/60 Hz and 2 to 150 kHz fields measured and reported in sham and active conditions

Element	Reported practice	Proposed criterion
Blinding	Possibly ineffective in 7 of 28 studies (25%) [R4]	Blinding verified: participant and assessor guesses recorded and analysed
Outcomes	Detection and self-rated symptoms [R2]	Objective endpoints chosen in advance (heart rate variability, EEG, sleep architecture, blood pressure, electrodermal activity, candidate laboratory markers); symptoms and detection as separate outcomes; tinnitus measures where relevant
Expectation	Nocebo proposed as an explanation [R2]	Expectation, anxiety and attribution measured before and during testing and analysed as variables, not used as a diagnosis of exclusion [R22, R24]
Conditioning and sensitization	Reaction to sham read as evidence of psychological origin [S1]	Participants stratified before provocation by measured degree of conditioned response and physiological sensitization; responses to inactive cues analysed separately from responses to real exposure
Statistics	75% gave no power estimate; 43% did not adjust for multiple comparisons [R4]	Preregistered protocol and analysis plan; power for individual and subgroup effects; control of multiplicity; deidentified data shared
Funding and interests	Industry-only funding associated with fewer significant results [R14]	Public funding with a firewall for any private contribution; declared interests of every investigator; collaboration between investigators holding different hypotheses
Interpretation	Detection results used to judge biological effect [S2]	Detection, symptoms and physiology reported separately; each null result states the smallest effect, the exposure and the group it excludes

Three principles govern interpretation. A null result on detection is not read as a null result on physiology; a null result in a pooled group is not read as a null result in every subgroup; and a reaction to an inactive cue is not read as evidence about the original trigger. Each negative study is reported for the question it actually tested.

> **Required output.** Revised criteria published by HHS for public comment and then adopted as requirements for funding and as criteria for appraising evidence.

7 A Clinical Assessment Pathway and Professional Education

Why a pathway is needed

Dr. Muñoz-Calero reports that when patients who report EHS are labelled with a psychological condition before possible biological components are investigated, they lose access to appropriate medical care. [S2] France's 2018 expert assessment found no validated diagnostic criteria. [R40] In 2002 the U.S. Access Board stated that electromagnetic sensitivities "may be considered disabilities under the ADA" when they substantially limit a major life activity. [R41] HHS has issued no guidance on how these patients should be assessed, treated or accommodated.

Elements of the pathway

Medical evaluation first. A targeted history and examination, differential diagnosis of conditions that produce similar symptoms, and urgent referral for warning signs such as sudden hearing loss. [R34, R35]

Differential assessment before attribution. Exposure history and onset, degree of conditioned involvement, physiological sensitization and objective markers assessed together, as in the EFEIA Differential Diagnosis Protocol, before any environmental, physiological or psychological attribution is made. [S1]

Environmental history. Device locations and operating states, charging near the bed, electrical equipment, powered beds, nearby machinery and the timing of symptoms, recorded on a standard form. [S3]

Measurement where indicated. Assessment of the home, and especially the bedroom, by a qualified assessor with calibrated instruments across RF, 50/60 Hz and 2 to 150 kHz bands. The presence of a device does not establish an elevated exposure; the exposure must be measured. [S3, R13]

Associated sensitivities and sleep. Screening for MCS and other central sensitivity features, and sleep assessment with a validated instrument. [R19, R39]

Audiology when indicated. Comprehensive audiological evaluation, with extended high frequencies where appropriate, and validated tinnitus measures. [R34, S3]

Integrated, trauma-informed care. Environmental remediation, physiological support and trauma-informed psychological care, including cognitive behavioral therapy for distress, offered together rather than one in place of another. Expectation and conditioning are assessed respectfully as possible contributors, neither dismissed nor used to close inquiry. [R34, S3, S1]

Documented management. Changes to the exposure environment recorded as interventions, with outcome measures before and after, and reported to the registry in Part 8 without being presumed effective. [S3]

Accommodation. Reasonable accommodation at work, at school and in health care settings where symptoms substantially limit a major life activity, the condition under which the Access Board recognized that these sensitivities may be disabilities under the ADA. [R41]

Professional education

Training for primary care, audiology, occupational medicine and environmental health professionals would cover the evidence, the pathway, the basics of measurement and respectful communication. It would draw on EFEIA's proposed national program for scientific integration and professional education. [S8] Dr. Muñoz-Calero teaches environmental medicine to health professionals and has offered to collaborate. [S2]

> **Required output.** HHS clinical guidance for the assessment, care and accommodation of people who report EHS, prepared with NIEHS and CDC, and a training curriculum for the professions named above.

8 Registry, Biomarker Replication and Intervention Trials

A consented clinical registry

In its current remand proceeding, the FCC has said that it does not "anticipate affording such weight" to "unverifiable or repetitive testimonial submissions." [R42] A registry turns individual reports into verifiable data. It would be prospective, consented and independently reviewed, with standardized audiology, repeated validated patient-reported measures, symptom diaries, sleep assessment, medication and acoustic histories and measured exposure. Analyses would cover clinically defined subgroups, including patients who report close device proximity and night-time worsening, without assuming that these features establish EHS. [S3]

The registry complements the National Census of electromagnetic hypersensitivity proposed in Section 3 of this submission. [S10] Questionnaires A and B of EFEIA's National Census Plan and the EFEIA Differential Diagnosis Protocol could supply the habits, symptom and differential assessment modules once their reliability and validity have been tested within the registry. [S9, S1] Case reports would enter a federal intake paired with clinical assessment and measured exposure.

Longitudinal follow-up

By 2018 no follow-up of people with EHS had exceeded one year. [R40] Registry participants would be followed for at least two years, with home logging of RF, 50/60 Hz and 2 to 150 kHz fields, peaks as well as averages, because the individual-level associations found over three weeks of exposimetry involved peaks and rate of change rather than the average. [R8, R13]

Biomarker replication

The markers listed in Part 3 would be measured blind, in more than one laboratory, against concurrent control groups, with case definitions fixed before analysis. A subset of participants would undergo provocation combined with transcriptomic and proteomic measures. [R15, R17, R11] Studies would also examine how conditioned stress responses and physiological sensitization interact, including their relationship with MCS and central sensitivity syndromes. [S1, R19] A clear result in either direction would be informative.

Intervention trials

Independent studies of environmental management would use real and sham interventions where feasible, randomized or counterbalanced order, blinded assessment, verified changes in exposure and adequate follow-up, with concurrent care recorded and expectation measured. Improvement would be judged against a comparison, not inferred from a before-and-after sequence. [S3] The program would evaluate exposure management, not commercial products.

> **Required output.** A registry protocol, a first deidentified data release, the results of the biomarker replication and a pilot intervention trial with a sham comparison.

9 Independence and Conflicts of Interest

The credibility of this work depends on who designs and funds it. Industry funding has been associated with fewer positive results. [R14] Funding from advocacy organizations should be

disclosed in the same way; the review of mechanisms cited in Part 3, for example, lists an advocacy organization as its funder. [R21] The program would be governed by an independent scientific steering committee of clinicians, methodologists, measurement specialists, patient representatives and investigators who have published both positive and null findings, working on shared protocols.

Funding would be public, with any private contribution routed through a firewall. Protocols and analysis plans would be preregistered and fixed before unblinding, and deidentified data would be shared. Every investigator, including the proponent and the authors of the letters, would declare interests, and no participant would be asked to buy or use any product.

> **Required output.** A governance charter and a public register of declared interests, issued before the first protocol.

10 Precaution While Knowledge Advances

The request letter and Dr. Muñoz-Calero both ask that the precautionary principle be applied while knowledge advances, especially in hospitals, schools and settings where the most vulnerable people are present. [S1, S2] Several facts support a proportionate response now. In May 2011, IARC classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B). [R43, R44] In 2021 the D.C. Circuit held that the FCC had failed to provide a reasoned explanation for its determination that its guidelines adequately protect against harmful effects of RF exposure unrelated to cancer, and remanded the matter. [R45]

Exposure guidelines are built on thresholds for tissue heating: ICNIRP takes a whole-body SAR of 4 W/kg, associated with a 1 °C rise in core temperature, and applies a reduction factor of 50 for the public limit of 0.08 W/kg. [R46] People who report EHS describe long-duration, close-range and night-time exposures. Compliance with heating-based limits does not show that their exposure is under control.

Proportionate measures do not require new numerical limits: wired connections and device-free options in patient rooms and classrooms on request, information for staff and families, and accommodation for people whose symptoms limit major life activities. They are reversible and can be evaluated within the program.

11 Implementation and Agency Roles

We propose a 24-month initial program: six months of preparation, twelve of data collection and six of analysis and reporting. The schedule would deliver revised criteria, clinical guidance and a first national report; longer-term follow-up would continue afterward.

Table 2. Initial program, by phase.

Months	Work	Outputs
1 to 6	Steering committee, charter and register of interests; audit of existing provocation studies against the criteria; consensus on case definition, phenotypes and a core outcome set including tinnitus; validation of measures of conditioned response and sensitization; preregistration of protocols; ethics approvals; pilot training	Criteria published for comment; audit ratings; core outcome set; preregistered protocols
7 to 18	Registry enrolment with measured exposure; multi-site individual-level provocation studies, stratified by conditioning and sensitization, with objective endpoints; blinded biomarker replication with concurrent controls; tinnitus sub-study with audiology; pilot intervention trial with sham comparison	Datasets logged with calibration records, blinding checks and protocol deviations
19 to 24	Analysis to the preregistered plans; clinical guidance and training curriculum; evaluation of precautionary measures in pilot settings	First national report; draft HHS clinical guidance; curriculum; deidentified data release; recommendations for continued research

Proposed agency roles

OASH would convene the program and its steering committee. NIH, through NIEHS, would lead exposure assessment, biomarker replication and the environmental modules of the registry, and, through NIDCD, the tinnitus and sound intolerance outcome set and audiological protocols. CDC would advise on case definition, registry methods and the federal intake of case reports, and would prepare the clinical guidance with NIEHS. FDA's Center for Devices and Radiological Health would support exposure systems and dosimetry for provocation studies. NIST and university laboratories would support measurement traceability. These are proposed roles, not claims of an existing mandate or endorsement.

Criteria for program success

Success would mean revised criteria adopted for funding and appraisal; protocols that independent groups can reproduce; a registry with measured exposure and validated outcomes; a biomarker replication with a clear result either way; and clinical guidance that gives patients a documented path through care. It would not be defined by confirming or refuting a predetermined hypothesis.

Institutional contribution. EFEIA offers its questionnaires, its Differential Diagnosis Protocol, its field measurement experience and the clinical collaboration of the specialists who join this request, and is prepared to share the protocol and de-identified case data with independent investigators. [S1-S3, S9] Any use of EFEIA data, instruments or staff would require documented arrangements, participant consent and independent oversight.

12 The Proposed National Commitment

People who report electromagnetic hypersensitivity enter the federal record today mainly as testimony. WHO recognizes their symptoms as real, federal accessibility language recognizes that their condition may be a disability, and their clinicians describe delayed responses, conditioned and sensitized responses, overlapping sensitivities and, in some, tinnitus whose onset or escalation they

consider may be amplified by near-source exposure, a hypothesis they ask to have tested. The studies used to judge their condition were designed for a narrower question. [R1, R41, S1-S3]

Over 15 years as an electromagnetic radiation researcher, I have measured the environments these people describe. In a four-year cohort followed with Dr. Leal Lue and in more than 1,500 cases reviewed through EFEIA's consultant network the same pattern recurs, and the physicians who support this request report it in their clinics. [S1] That experience does not establish causation. It is the reason to ask for studies capable of giving a clear answer.

The decisions requested

Review the criteria. Convene an independent review of how EHS studies are designed and interpreted, and publish revised criteria for comment.

Fund decisive studies. Support individual-level, blinded studies with objective endpoints, delayed-response windows and participants stratified by conditioned response and sensitization, and a blinded multi-site replication of candidate biomarkers.

Give patients a pathway. Issue clinical guidance and training for differential assessment, integrated care and accommodation, including tinnitus and sound intolerance.

Build the record. Establish a consented registry with measured exposure and a federal intake that turns individual reports into verifiable data.

Apply proportionate precaution. Offer accommodation and low-exposure options in hospitals, schools and care settings while the program proceeds.

Our proposed outcome is a body of evidence that patients, clinicians and regulators can accept as a fair test of the question.

References and Supporting Documentation

Source identifiers distinguish independent research, guidelines and records (R) from the documents supplied by the proponent and the letters submitted with this proposal (S). The program design and requests are proposals by the author. Each source closes with its evidence grade. EFEIA documents with a DOI are cited in APA format.

Independent research, guidelines and records

R1 World Health Organization. Electromagnetic fields and public health: electromagnetic hypersensitivity. Backgrounder, December 2005 (issued as Fact sheet No. 296). Geneva: WHO. https://www.who.int/teams/environment-climate-change-and-health/radiation-and-health/non-ionizing/hypersensitivity. (b, institutional)

R2 Rubin GJ, Nieto-Hernandez R, Wessely S. Idiopathic environmental intolerance attributed to electromagnetic fields (formerly 'electromagnetic hypersensitivity'): an updated systematic review of provocation studies. Bioelectromagnetics. 2010;31(1):1-11. doi:10.1002/bem.20536. (a)

R3 Bosch-Capblanch X, Esu E, Oringanje CM, et al. The effects of radiofrequency electromagnetic fields exposure on human self-reported symptoms: a systematic review of human experimental studies. Environment International. 2024;187:108612. doi:10.1016/j.envint.2024.108612. Corrigendum: Environment International. 2024;190:108892. doi:10.1016/j.envint.2024.108892. (a; WHO-commissioned (stated))

R4 Schmiedchen K, Driessen S, Oftedal G. Methodological limitations in experimental studies on symptom development in individuals with idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF): a systematic review. Environmental Health. 2019;18:88. doi:10.1186/s12940-019-0519-x. (a)

R5 van Moorselaar I, Slottje P, Heller P, et al. Effects of personalised exposure on self-rated electromagnetic hypersensitivity and sensibility: a double-blind randomised controlled trial. Environment International. 2017;99:255-262. doi:10.1016/j.envint.2016.11.031. (a)

R6 Ledent M, Bordarie J, Vatovez B, et al. Exposure perception and symptom reporting in idiopathic environmental intolerance attributed to electromagnetic fields using a co-designed provocation test. Bioelectromagnetics. 2025;46(3):e70006. doi:10.1002/bem.70006. (a)

R7 Rubin GJ, Das Munshi J, Wessely S. Electromagnetic hypersensitivity: a systematic review of provocation studies. Psychosomatic Medicine. 2005;67(2):224-232. doi:10.1097/01.psy.0000155664.13300.64. (a)

R8 Bogers RP, van Gils A, Clahsen SCS, et al. Individual variation in temporal relationships between exposure to radiofrequency electromagnetic fields and non-specific physical symptoms: a new approach in studying 'electrosensitivity'. Environment International. 2018;121(Pt 1):297-307. doi:10.1016/j.envint.2018.08.064. (a)

R9 McCarty DE, Carrubba S, Chesson AL, et al. Electromagnetic hypersensitivity: evidence for a novel neurological syndrome. International Journal of Neuroscience. 2011;121(12):670-676. doi:10.3109/00207454.2011.608139. (a, single-subject study)

R10 Dieudonné M. Electromagnetic hypersensitivity: a critical review of explanatory hypotheses. Environmental Health. 2020;19:48. doi:10.1186/s12940-020-00602-0. (a)

R11 Leszczynski D. Review of the scientific evidence on the individual sensitivity to electromagnetic fields (EHS). Reviews on Environmental Health. 2022;37(3):423-450. doi:10.1515/reveh-2021-0038. (a)

R12 Baliatsas C, Van Kamp I, Lebret E, Rubin GJ. Idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF): a systematic review of identifying criteria. BMC Public Health. 2012;12:643. doi:10.1186/1471-2458-12-643. (a)

R13 IEEE Std C95.3-2021. Recommended practice for measurements and computations of electric, magnetic, and electromagnetic fields with respect to human exposure to such fields, 0 Hz to 300 GHz. New York: IEEE; 2021. (a, standard)

R14 Huss A, Egger M, Hug K, et al. Source of funding and results of studies of health effects of mobile phone use: systematic review of experimental studies. Environmental Health Perspectives. 2007;115(1):1-4. doi:10.1289/ehp.9149. (a)

R15 Belpomme D, Campagnac C, Irigaray P. Reliable disease biomarkers characterizing and identifying electrohypersensitivity and multiple chemical sensitivity as two etiopathogenic aspects of a unique pathological disorder. Reviews on Environmental Health. 2015;30(4):251-271. doi:10.1515/reveh-2015-0027. (a, case series without control group)

R16 Belpomme D, Irigaray P. Electrohypersensitivity as a newly identified and characterized neurologic pathological disorder: how to diagnose, treat, and prevent it. International Journal of Molecular Sciences. 2020;21(6):1915. doi:10.3390/ijms21061915. Tinnitus and hyperacusis figures from its Table 3, which the authors attribute to Belpomme D, Hardell L, Belyaev I, et al. Environmental Pollution. 2018;242(Pt A):643-658. doi:10.1016/j.envpol.2018.07.019. (a; funding from ARTAC, ECERI and the Osato Research Institute (stated))

R17 De Luca C, Thai JC, Raskovic D, et al. Metabolic and genetic screening of electromagnetic hypersensitive subjects as a feasible tool for diagnostics and intervention. Mediators of Inflammation. 2014;2014:924184. doi:10.1155/2014/924184. (a)

R18 Landgrebe M, Frick U, Hauser S, et al. Cognitive and neurobiological alterations in electromagnetic hypersensitive patients: results of a case-control study. Psychological Medicine. 2008;38(12):1781-1791. doi:10.1017/S0033291708003097. (a)

R19 Yunus MB. Central sensitivity syndromes: a new paradigm and group nosology for fibromyalgia and overlapping conditions, and the related issue of disease versus illness. Seminars in Arthritis and Rheumatism. 2008;37(6):339-352. doi:10.1016/j.semarthrit.2007.09.003. (a)

R20 Belyaev I, Dean A, Eger H, et al. EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. Reviews on Environmental Health. 2016;31(3):363-397. doi:10.1515/reveh-2016-0011. (a, professional guideline)

R21 Stein Y, Udasin IG. Electromagnetic hypersensitivity (EHS, microwave syndrome): review of mechanisms. Environmental Research. 2020;186:109445. doi:10.1016/j.envres.2020.109445. (a; funder listed as Environmental Health Trust (stated), noted, not downgraded)

R22 Witthöft M, Rubin GJ. Are media warnings about the adverse health effects of modern life self-fulfilling? An experimental study on idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF). Journal of Psychosomatic Research. 2013;74(3):206-212. doi:10.1016/j.jpsychores.2012.12.002. (a)

R23 Dieudonné M. Does electromagnetic hypersensitivity originate from nocebo responses? Indications from a qualitative study. Bioelectromagnetics. 2016;37(1):14-24. doi:10.1002/bem.21937. (a)

R24 Bräscher AK, Raymaekers K, Van den Bergh O, Witthöft M. Are media reports able to cause somatic symptoms attributed to WiFi radiation? An experimental test of the negative expectation hypothesis. Environmental Research. 2017;156:265-271. doi:10.1016/j.envres.2017.03.040. (a)

R25 Van den Bergh O, Witthöft M, Petersen S, Brown RJ. Symptoms and the body: taking the inferential leap. Neuroscience and Biobehavioral Reviews. 2017;74(Pt A):185-203. doi:10.1016/j.neubiorev.2017.01.015. (a)

R26 Bell IR, Miller CS, Schwartz GE. An olfactory-limbic model of multiple chemical sensitivity syndrome: possible relationships to kindling and affective spectrum disorders. Biological Psychiatry. 1992;32(3):218-242. doi:10.1016/0006-3223(92)90105-9. (a)

R27 Bhatt JM, Lin HW, Bhattacharyya N. Prevalence, severity, exposures, and treatment patterns of tinnitus in the United States. JAMA Otolaryngology Head and Neck Surgery. 2016;142(10):959-965. doi:10.1001/jamaoto.2016.1700. (a)

R28 Landgrebe M, Frick U, Hauser S, et al. Association of tinnitus and electromagnetic hypersensitivity: hints for a shared pathophysiology? PLoS One. 2009;4(3):e5026. doi:10.1371/journal.pone.0005026. (a)

R29 Nordin S, Neely G, Olsson D, Sandström M. Odor and noise intolerance in persons with self-reported electromagnetic hypersensitivity. International Journal of Environmental Research and Public Health. 2014;11(9):8794-8805. doi:10.3390/ijerph110908794. (a)

R30 Hutter HP, Moshammer H, Wallner P, et al. Tinnitus and mobile phone use. Occupational and Environmental Medicine. 2010;67(12):804-808. doi:10.1136/oem.2009.048116. (a)

R31 Röösli M, Dongus S, Jalilian H, et al. The effects of radiofrequency electromagnetic fields exposure on tinnitus, migraine and non-specific symptoms in the general and working population: a systematic review and meta-analysis on human observational studies. Environment International. 2024;183:108338. doi:10.1016/j.envint.2023.108338. (a; WHO-commissioned (stated))

R32 Henry JA, Roberts LE, Caspary DM, et al. Underlying mechanisms of tinnitus: review and clinical implications. Journal of the American Academy of Audiology. 2014;25(1):5-22. doi:10.3766/jaaa.25.1.2. (a)

R33 Auerbach BD, Rodrigues PV, Salvi RJ. Central gain control in tinnitus and hyperacusis. Frontiers in Neurology. 2014;5:206. doi:10.3389/fneur.2014.00206. (a)

R34 Adams ME, Cramer JD, Tunkel DE, et al. Clinical practice guideline: tinnitus update. Otolaryngology Head and Neck Surgery. 2026;175(Suppl 1):S1-S62. doi:10.1002/ohn.70417. Published 12 October 2026; updates the 2014 guideline. (a, clinical practice guideline)

R35 Chandrasekhar SS, Tsai Do BS, Schwartz SR, et al. Clinical practice guideline: sudden hearing loss (update). Otolaryngology Head and Neck Surgery. 2019;161(1 Suppl):S1-S45. doi:10.1177/0194599819859885. (a, clinical practice guideline)

R36 National Institute on Deafness and Other Communication Disorders. Sudden deafness. NIH Pub. No. 00-4757. Last updated 14 September 2018. https://www.nidcd.nih.gov/health/sudden-deafness. (b, agency web page)

R37 Newman CW, Jacobson GP, Spitzer JB. Development of the Tinnitus Handicap Inventory. Archives of Otolaryngology Head and Neck Surgery. 1996;122(2):143-148. doi:10.1001/archotol.1996.01890140029007. (a)

R38 Meikle MB, Henry JA, Griest SE, et al. The Tinnitus Functional Index: development of a new clinical measure for chronic, intrusive tinnitus. Ear and Hearing. 2012;33(2):153-176. doi:10.1097/AUD.0b013e31822f67c0. (a)

R39 Buysse DJ, Reynolds CF 3rd, Monk TH, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Research. 1989;28(2):193-213. doi:10.1016/0165-1781(89)90047-4. (a)

R40 ANSES. Hypersensibilité électromagnétique ou intolérance environnementale idiopathique attribuée aux champs électromagnétiques. Avis de l'Anses et rapport d'expertise collective. Auto-saisine n° 2011-SA-0150.

Maisons-Alfort: ANSES; March 2018. https://www.anses.fr/fr/system/files/AP2011SA0150Ra.pdf. (b, institutional report)

R41 Architectural and Transportation Barriers Compliance Board (U.S. Access Board). Americans with Disabilities Act (ADA) accessibility guidelines for buildings and facilities; recreation facilities. Final rule. Federal Register. 2002;67(170):56352-56440, at 56353. FR Doc. 02-21805. https://www.govinfo.gov/content/pkg/FR-2002-09-03/html/02-21805.htm. (a, federal regulatory record)

R42 Federal Communications Commission, Office of Engineering and Technology. FCC seeks comment on RF exposure issues subject to D.C. Circuit remand in Environmental Health Trust v. FCC. Public Notice DA 26-997, ET Docket No. 13-84, released 17 September 2026. Federal Register. 2026;91(182):60128-60131. (a, regulatory record)

R43 Baan R, Grosse Y, Lauby-Secretan B, et al. Carcinogenicity of radiofrequency electromagnetic fields. Lancet Oncology. 2011;12(7):624-626. doi:10.1016/S1470-2045(11)70147-4. (a)

R44 International Agency for Research on Cancer. Non-ionizing radiation, Part 2: radiofrequency electromagnetic fields. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 102. Lyon: IARC; 2013. https://publications.iarc.who.int/126. (b, institutional monograph)

R45 Environmental Health Trust v. Federal Communications Commission, 9 F.4th 893 (D.C. Cir. 2021). Nos. 20-1025 and 20-1138, decided 13 August 2021. https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf. (a, court record)

R46 ICNIRP. Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz). Health Physics. 2020;118(5):483-524. doi:10.1097/HP.0000000000001210. (a, standards body)

Proponent-supplied and supporting documents

S1 Machado JJ. Letter to the U.S. Department of Health and Human Services: request to review the criteria used to evaluate and interpret electromagnetic hypersensitivity (EHS); clinical observations and proposal. Miami: EFEIA Institute; 21 October 2026. Submitted with this proposal. (c, letter; clinical and observational experience, not controlled evidence; the writer is the author of this proposal and NOXTAK's founder and CTO)

S2 Muñoz-Calero P. Letter to the U.S. Department of Health and Human Services: support for the request to review the criteria used to evaluate and interpret electromagnetic hypersensitivity (EHS). Madrid: Fundación Alborada; 8 October 2026. Signed letter, submitted with this proposal. (c, supporting letter; clinical experience and expert position)

S3 Valdés LM. Letter to the U.S. Department of Health and Human Services: clinical observations on electromagnetic hypersensitivity and the amplification of tinnitus. 21 October 2026. Submitted with this proposal. (c, supporting letter; clinical observations, not controlled evidence; the writer is co-author with the author of S4)

S4 Valdés, L. M., & Machado, J. J. (2026). *From Havana syndrome to catastrophic tinnitus and extreme electromagnetic hypersensitivity: Cumulative load, triggering peaks, and the susceptible phenotype* [Working paper, Part 5 of a clinical and mechanistic series on tinnitus and electromagnetic fields]. EFEIA Research Institute. Zenodo. https://doi.org/10.5281/zenodo.23522254. (b, working paper; observations and hypotheses; the second author is NOXTAK's founder and CTO)

S5 Machado JJ, Leal R. Prevalence and effects of electrohypersensitivity: evaluating the application of SPIRO in the management of EHS in a longitudinal study of 357 patients, 2014-2018. Preprint; March 2019. doi:10.13140/RG.2.2.21974.11849. (b, preprint, uncontrolled; first author is NOXTAK's founder and CTO; evaluates a NOXTAK product)

S6 EFEIA Institute. EHS Global Census 2025. Cross-Survey Analysis with Sensitivity Profiles (complete cohort n = 94). Analysis dated 15 December 2025; v2 modified 18 February 2026. https://efeia.org/wp-content/uploads/2026/02/EHS-GC-2025-Cross-Survey-Analysis-with-Sensitivity-Profiles-2.pdf. Correlations from the Section 4.4 table (the executive summary prints 0.633, 0.460 and 0.416). (b, institutional report; EFEIA's own data, cross-sectional, self-selected and self-reported)

S7 Machado, J. J. (2026). *Bluetooth headphones and RF-EMF in teenage tinnitus: Chronic in-ear wireless exposure as a complementary environmental toxin candidate* [Evidence review]. EFEIA Institute, SPECTRA program. Zenodo. https://doi.org/10.5281/zenodo.23519286. (b, evidence review; the author is NOXTAK's founder and CTO)

S8 Machado, J. J. (2026). *National program for scientific integration and professional education on electromagnetic exposure and health: A four stage proposal for evidence review and interdisciplinary consensus* [Proposal; Exhibit 6A of this submission]. Zenodo. https://doi.org/10.5281/zenodo.23513425. (b, institutional proposal)

S9 Machado, J. J. (2026). *National Census Plan: Technology habits and symptoms associated with electromagnetic sensitivity concerns* [Proposal; Exhibit 3B of this submission]. Zenodo. https://doi.org/10.5281/zenodo.23513476. (b, institutional proposal; questionnaires not yet validated)

S10 Machado, J. J. (2026). *A national census of electromagnetic hypersensitivity (EHS, IEI-EMF), and EMF as a potential amplifier of existing health conditions* [Section 3 summary of this submission]. Zenodo. https://doi.org/10.5281/zenodo.23523491. (b, institutional summary)

The letters of J. Joaquín Machado, Dr. Pilar Muñoz-Calero and Dr. Luis M. Valdés are submitted with this proposal as received; this proposal does not alter their content, and where it reports a published figure it cites the original source.