



Spotlight on EMF Research

Literaturliste 2025/3 (07.2025 bis 09.2025)

Dies ist die Liste der zwischen Juli 2025 und September 2025 gesichteten Publikationen, aus denen Artikel ausgewählt wurden, um sie im Rahmen von „Spotlight on EMF Research“ zu besprechen. Die Liste ist nach Kategorien (= Frequenzbereich, Studiendesign) und anschließend nach Namen sortiert. Die Zahl in Klammern gibt die Menge der Publikationen in der jeweiligen Kategorie an. Informationen über „Spotlight on EMF Research“ finden Sie auf der [BfS-Homepage](#).

This is the list of publications screened between July 2025 and September 2025, from which we selected articles to be reviewed in our „Spotlight on EMF Research“ series. The list is sorted by category (= frequency range, study design) and on a second level by name. The number of publications in a specific category is given in parantheses.

Please find more information on „Spotlight on EMF Research“ on the [BfS website](#).

Inhalt / Contents

Across frequencies (21)	1
across frequencies – animal study (1)	1
across frequencies – dosimetry/exposure (4)	1
across frequencies – epidemiology (5)	1
across frequencies – human study (1)	1
across frequencies – in vitro study (2)	1
across frequencies – plant study (0)	2
across frequencies – review (5)	2
across frequencies – theory/molecular mechanism (3)	2
Low frequency (95)	2
low frequency – animal study (24)	2
low frequency – dosimetry/exposure (15)	4
low frequency – epidemiology (5)	5
low frequency – human study (3)	5
low frequency – in vitro study (20)	6
low frequency – plant study (13)	7
low frequency – review (3)	8
low frequency – theory/molecular mechanism (12)	8
Intermediate frequency (3)	9
intermediate frequency – animal study (0)	9
intermediate frequency – dosimetry/exposure (2)	9
intermediate frequency – epidemiology (0)	9
intermediate frequency – human study (0)	10
intermediate frequency – in vitro study (0)	10
intermediate frequency – plant study (1)	10
intermediate frequency – review (0)	10
intermediate frequency – theory/molecular mechanism (0)	10
Radiofrequency (137)	10
radiofrequency – animal study (30)	10
radiofrequency – dosimetry/exposure (54)	12
radiofrequency – epidemiology (8)	15
radiofrequency – human study (7)	16
radiofrequency – in vitro study (12)	17
radiofrequency – plant study (5)	17
radiofrequency – review (16)	18
radiofrequency – theory/molecular mechanism (5)	19

Across frequencies (21)

across frequencies – animal study (1)

Moayed A, Long JA, Kölzsch A, Kruckenberg H, Benitez-Paez F, Demsar U. **Multi-modal, interrelated navigation in migratory birds: A data mining study.** *Ecological Informatics*. 2025;90:103218. <https://doi.org/10.1016/j.ecoinf.2025.103218>

across frequencies – dosimetry/exposure (4)

Bang KW, Park SW, Bae HG, Lee BY, Park CU, Oh HM, Baek SH. **Evaluation of Electromagnetic Exposure in Dynamic Wireless Power Transfer System for Electric Bus.** *International Journal of Automotive Technology*. 2025;eFIRST-2025-08. <https://doi.org/10.1007/s12239-025-00318-5>

Guarniere MR, Palone F, Spezie R, Buono L, Papi L, Tresso G, Lauria S, Maccioni M. **Compact “5-Phases” OHLs: Performances and EMFs.** *IEEE Transactions on Industry Applications*. 2025;eFIRST-2025-07:1–10. <https://doi.org/10.1109/tia.2025.3586568>

Kalatzis D, Ploussi A, Spyratou E, Panagiotakopoulos T, Efstathopoulos EP, Kiouvrekis Y. **Explainable AI for Spectral Analysis of Electromagnetic Fields.** *IEEE Access*. 2025;13:113407–113427. <https://doi.org/10.1109/access.2025.3583944>

Wei S, Zhou C, Huang L. **Analysis of the Electromagnetic Radiation Emitted by Cosmetic Laser and Light Equipment.** *Aesthetic plastic surgery*. 2025;eFIRST-2025-07. <https://doi.org/10.1007/s00266-025-05013-5>

across frequencies – epidemiology (5)

Choudhary P, Dogra P, Sharma K. **Infertility and lifestyle factors: how habits shape reproductive health.** *Middle East Fertility Society Journal*. 2025;30(1):14. <https://doi.org/10.1186/s43043-025-00228-7>

Gasparini R, Gobba F, Bogi A, Calcagnini G, Censi F, Falsaperla R, Mattei E, Vivarelli C, D'Agostino S, Modenese A. **Results of a national survey among occupational physicians to estimate the number of workers with active medical devices and their types in the context of managing electromagnetic hazards.** *Frontiers in Public Health*. 2025;13:1599754. <https://doi.org/10.3389/fpubh.2025.1599754>

He ZC, Shang YX, Xu XP, Jia CY, Wang YP. **[Multi-omics Mendelian randomization study on the causality between non-ionizing radiation and facial aging].** *Zhonghua shao shang yu chuang mian xiu fu za zhi*. 2025;41(6):594–603. <https://doi.org/10.3760/cma.j.cn501225-20240830-00320>

Kantor D, Kanclerz G, Taton G. **Is the occurrence of electromagnetic hypersensitivity related to sensitivity to air pollution and weather factors?** *AIMS Biophysics*. 2025;12(2):259–272. <https://doi.org/10.3934/biophy.2025014>

Mohamed H, Fawzy MS, Mehmood SI, Alali AO, Alanazi LG, Alanazi FK, Alanazi HNN. **Awareness and Perception of Electromagnetic Field Exposure Risk among Health Professional Students: from a Public Institute.** *Global Journal of Medical Pharmaceutical and Biomedical Update*. 2025;20:11. https://doi.org/10.25259/GJMPBU_44_2024

across frequencies – human study (1)

Schmitz N, Wolters C, Rahrbach A, Kalke F, Witthoft M, Gerlach AL, Pohl A. **Do expectations shape interoceptive perceptions across body domains? A sham EMF study to test the predictive processing theory.** *International journal of clinical and health psychology*. 2025;25(3):100609. <https://doi.org/10.1016/j.ijchp.2025.100609>

across frequencies – in vitro study (2)

- Truglia B, Castria S, Brown D, Lim L, de Wever B, Lewis J, Tuszyński JA. **Effects of Light-Induced Electromagnetic Fields on Human Cancer Cells.** *Bioelectricity*. 2025;eFIRST-2025-09. <https://doi.org/10.1177/25763113251376255>
- Zhai C, Cai J, Du M, Fei Y, Wu Q. **Assessing Microglial Phagocytosis of Myelin Debris in vitro Under Repeated Magnetic Stimulation.** *Journal of visualized experiments : JoVE*. 2025;2025(220):e67642. <https://doi.org/10.3791/67642>

across frequencies – plant study (0)

across frequencies – review (5)

- Ge WY, Yin DC. **Decoding physical environment's role in protein phase transition.** *Advances in colloid and interface science*. 2025;345:103643. <https://doi.org/10.1016/j.cis.2025.103643>
- Kim DH, Kim BH. **A Study on the Social Perception of Risks From Electromagnetic Wave-Focusing on Big Data-Based Text Mining Analysis.** *Sage Open*. 2025;15(2):21582440251340132. <https://doi.org/10.1177/21582440251340132>
- Maipas S, Vardiambasis IO, Nikolopoulos CD, Kavantzias N. **A Mini-Review of the Potential Health Impacts of Indoor Radiation Exposure in Companion Animals.** *Environmental health insights*. 2025;19:11786302251342972. <https://doi.org/10.1177/11786302251342972>
- Moulin T. **The phantom pain: an international law perspective on the weaponization of infrasound, ultrasound, and microwaves.** *Journal of Conflict & Security Law*. 2025;30(2):265–286. <https://doi.org/10.1093/jcsl/kraf009>
- Schulte-Römer N, Mommersteeg B. **EMF Risk and Hesitation in a Polarised World: Towards a Diplomatic Relativism.** *Historical Social Research -Historische Sozialforschung*. 2025;50(2):174–201. <https://doi.org/10.12759/hsr.50.2025.22>

across frequencies – theory/molecular mechanism (3)

- Latawiec EI, Chiesa A, Qiu Y, Tcyrulnikov NA, Young RM, Carretta S, Krzyaniak MD, Wasielewski MR. **Detecting chirality-induced spin selectivity in chromophore-linked DNA hairpins using photogenerated radical pairs.** *Proceedings of the National Academy of Sciences of the United States of America*. 2025;122(32):e2515120122. <https://doi.org/10.1073/pnas.2515120122>
- Panagopoulos DJ, Yakymenko I, De Iuliis GN, Chrousos GP. **A comprehensive mechanism of biological and health effects of anthropogenic extremely low frequency and wireless communication electromagnetic fields.** *Frontiers in public health*. 2025;13:1585441. <https://doi.org/10.3389/fpubh.2025.1585441>
- Trotter D, Pariz A, Hutt A, Lefebvre J. **Morphological variability may limit single-cell specificity to electric field stimulation.** *Frontiers in synaptic neuroscience*. 2025;17:1621352. <https://doi.org/10.3389/fnsyn.2025.1621352>

Low frequency (95)

low frequency – animal study (24)

- Aliyari H, Hosseinian M, Menhaj MB, Sahraei H, Shabani M, Kazemi M. **Effect of High-voltage Electrical Field Exposure on Neurobiological Factors and Visual Working Memory of Macaques.** *Basic and clinical neuroscience*. 2025;16(Spec Issue):251–264. <https://doi.org/10.32598/bcn.2023.2368.1>

- Baydilli EN, Yanardag AB, Sakin E, Yanardag IH, Dilekoglu MF. **Electromagnetic Pollution: Effects of High-Voltage Power Lines on Soil Health and Microbial Activity.** *Water, Air, & Soil Pollution*. 2025;236(12):819. <https://doi.org/10.1007/s11270-025-08403-2>
- Borah AJ, Barua AG. **Effects of electric fields on bioluminescence emissions of fireflies.** *Photochemistry and photobiology*. 2025;eFIRST-2025-08. <https://doi.org/10.1111/php.70019>
- Cek S, Unal E, Dogan EA, Yaras KU, Dede K, Karaaslan M. **Effect of Electromagnetic Field on Growth Parameters, Survival Rate, Sex Distribution, Ratio, and Liver and Gonadal Health of Zebrafish (Danio rerio).** *Bulletin of environmental contamination and toxicology*. 2025;115(3):33. <https://doi.org/10.1007/s00128-025-04103-z>
- Chapman ECN, Rochas CMV, Burns Z, Harsanyi P, Hermans A, Scott K. **Effects of electromagnetic fields on flatfish activity levels.** *Marine pollution bulletin*. 2025;222(Pt 1):118652. <https://doi.org/10.1016/j.marpolbul.2025.118652>
- Dreyer D, Adden A, Chen H, Frost B, Mouritsen H, Xu J, Green K, Whitehouse M, Chahl J, Wallace J, Hu G, Foster J, Heinze S, Warrant E. **Bogong moths use a stellar compass for long-distance navigation at night.** *Nature*. 2025;643(8073):994–1000. <https://doi.org/10.1038/s41586-025-09135-3>
- Garcia-Robledo C, Dierick D, Manser K. **Electric transportation and electroreception in hummingbird flower mites.** *Proceedings of the National Academy of Sciences of the United States of America*. 2025;122(5):e2419214122. <https://doi.org/10.1073/pnas.2419214122>
- Geng D, Liu A, Yan Y, Zheng W. **Intermittent ELF-MF exposure effectively ameliorates pathologic features associated with adult AD mice.** *Brain research*. 2025;1864:149796. <https://doi.org/10.1016/j.brainres.2025.149796>
- Ghassemkhani K, Dotta BT. **Can Theta Burst Electromagnetic Fields Disrupt Learning in Planaria? Evidence of Impaired Fear-Conditioned Responses.** *Bioelectromagnetics*. 2025;46(6):e70017. <https://doi.org/10.1002/bem.70017>
- Kakikawa M, Kenmochi A, Yamada S. **Effect of 60 Hz magnetic fields on social feeding behavior of npr-1 receptor mutants in Caenorhabditis elegans.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-06:1–9. <https://doi.org/10.1080/15368378.2025.2523773>
- Krzystolik J, Tanski A. **Exploring the effects of anthropogenic EMF on fish embryo development: Survival and orientation responses.** *Aquaculture Reports*. 2025;43:102953. <https://doi.org/10.1016/j.aqrep.2025.102953>
- Li H, Fang Y, Huang J. **Reactive oxygen species mediate bioeffects of static magnetic field via impairment of long-chain fatty acid degradation in Escherichia coli.** *Frontiers in microbiology*. 2025;16:1586233. <https://doi.org/10.3389/fmicb.2025.1586233>
- Pavlova V, Krylov V, Pankova N, Dushko A, Osipova E. **Locomotor activity rhythms in cavefish Astyanax mexicanus under slow magnetic fluctuations.** *Chronobiology international*. 2025;42(7):825–832. <https://doi.org/10.1080/07420528.2025.2513436>
- Piesiewicz R, Korzelecka-Orkisz A, Formicki K. **Effect of Magnetic Fields on the Development of the Larvae of the Jaguar Cichlid (Parachromis managuensis, Gunther, 1867) and the Green Terror (Andinoacara rivulatus, Gunther, 1860).** *Animals*. 2025;15(13):1824. <https://doi.org/10.3390/ani15131824>
- Piesiewicz R, Krzystolik J, Formicki K. **Impact of magnetic fields on the early ontogeny of the jaguar cichlid Parachromis managuensis Günther, 1867 and the green terror Andinoacara rivulatus Günther, 1860.** *European Zoological Journal*. 2025;92(1):720–729. <https://doi.org/10.1080/24750263.2025.2519423>
- Shively-Moore SA, Matter SF, Guerra PA. **Monarch butterflies (Danaus plexippus) only use magnetic cues for migratory directionality with orientation re-calibrated by coldness.** *PloS one*. 2025;20(8):e0328737. <https://doi.org/10.1371/journal.pone.0328737>
- Sirinyildiz F, Cesur G, Elmas O, Elmas S, Comlekci S, Yazici O, Keskin A, Keskin HE. **Effect of short-term extremely low-frequency electromagnetic field on respiratory functions.** *Revista da Associacao Medica Brasileira*. 2025;71(4):e20241812. <https://doi.org/10.1590/1806-9282.20241812>

- Sissons SM, Murugan NJ, Dotta BT. **Investigating Glial Fibrillary Acidic Protein Expression and Cell Morphology in a Rat Brain Following Exposure to a Weak Electromagnetic Field and Nitric Oxide Modulation During Development.** *Neuroglia*. 2025;6(2):21. <https://doi.org/10.3390/neuroglia6020021>
- Sizova AA, Sizov DA, Krylov VV. **The influence of possible consequences of global climate and geophysical changes on life history traits and alpha-amylase activity in *Daphnia magna* Straus.** *International journal of biometeorology*. 2025;eFIRST-2025-06. <https://doi.org/10.1007/s00484-025-02961-0>
- Werber Y, Adin E, Chapman JW, Reynolds DR, Sapir N. **Active navigation and meteorological selectivity drive insect migration patterns through the Levant.** *Proceedings of the Royal Society B - Biological Sciences*. 2025;292(2049):20250587. <https://doi.org/10.1098/rspb.2025.0587>
- Wu H, Yang Y, Chang W, Chen X, Yang S, Xu M, Liu K, Yun Y, Dong L. **Research on the effects and related mechanisms of geomagnetic storm on depression.** *Brain research bulletin*. 2025;226:111369. <https://doi.org/10.1016/j.brainresbull.2025.111369>
- Xie Y, Guo J, Su T, Tan B, Huang L, Lai J. **Growth and defense mechanism of *Phaeocystis globosa* exposed to extremely low frequency electromagnetic fields.** *Ecotoxicology and environmental safety*. 2025;301:118507. <https://doi.org/10.1016/j.ecoenv.2025.118507>
- Yap JLY, Wu KY, Tai YK, Fong CHH, Manazir N, Paul AP, Yeo O, Franco-Obregon A. **Brief Weekly Magnetic Field Exposure Enhances Avian Oxidative Muscle Character During Embryonic Development.** *International journal of molecular sciences*. 2025;26(11):5423. <https://doi.org/10.3390/ijms26115423>
- Zhang L, Geng D, Xu G, An H. **[Effect of 40 Hz pulsed magnetic field on mitochondrial dynamics and heart rate variability in dementia mice].** *Sheng wu yi xue gong cheng xue za zhi = Journal of biomedical engineering*. 2025;42(4):707–715. <https://doi.org/10.7507/1001-5515.202501061>

low frequency – dosimetry/exposure (15)

- Ahsan M, Baharom MNR, Khalil IU, Zainal Z. **Comparative analysis of mathematical and simulation models for electric field generated beneath 400 kV overhead transmission lines.** *Measurement*. 2025;256:118566. <https://doi.org/10.1016/j.measurement.2025.118566>
- Bouisset N, Carvallo A, Laporte M, Legros A. **Human achromatic flickers and phosphenes thresholds under extremely low frequency electric stimulations.** *Scientific reports*. 2025;15:23779. <https://doi.org/10.1038/s41598-025-06271-8>
- Ferro VM, D'avanzo MA, Mattozzi M, Testagrossa B, Ruello E, Denaro L, Sansotta C, Girardello F, Hartwig V, Aciri G. **Spatial-varying Magnetic Field Evaluation during Activities in an NMR Laboratory.** *Wseas Transactions on Biology and Biomedicine*. 2025;22:420–429. <https://doi.org/10.37394/23208.2025.22.39>
- Fukui H, Minami N, Tanezaki M, Muroya S, Ohkubo C. **Magnetic Field Measurement of Various Types of Vehicles, Including Electric Vehicles.** *Electronics*. 2025;14(15):2936. <https://doi.org/10.3390/electronics14152936>
- Kamitani N, Miyazaki A, Tomida S, Shimizu K, Ohira N, Kondo K, Miura H, Koyama D, Tominaga S, Henmi R, Sugiura R, Masui H. **Impact of magnetic fields from tablets, laptops, smartphones, and household/leisure magnets on cardiac implantable electronic devices.** *Journal of Arrhythmia*. 2025;41(4):e70106. <https://doi.org/10.1002/joa3.70106>
- Kangasmaa O, Lehtinen T, Laakso I. **Alvar whole-body model: impact of muscle anisotropy on computational dosimetry.** *Physics in medicine and biology*. 2025;eFIRST-2025-08. <https://doi.org/10.1088/1361-6560/adfe31>
- Kryukov A, Suslov K, Seredkin D, Voronina E, Batukhtin A, Ilyushin P, Shepovalova O. **Reducing electromagnetic pollution of the environment at main railway facilities.** *Management of Environmental Quality*. 2025;eFIRST-2025-06. <https://doi.org/10.1108/Meq-04-2025-0234>
- Li Y, Zhang JW. **Underwater Low-Frequency Magnetic Field Detection Based on 's Sliding Threshold Method.** *Sensors*. 2025;25(11):3364. <https://doi.org/10.3390/s25113364>

- Rathebe PC, Kholopo M. **Instruments and Measurement Techniques to Assess Extremely Low-Frequency Electromagnetic Fields.** *Sensors*. 2025;25(15):4866. <https://doi.org/10.3390/s25154866>
- Remy VFM, Innocent G, Vernez D, Guseva Canu I. **Bus-exposure matrix, a tool to assess bus drivers' exposure to physicochemical hazards.** *Annals of work exposures and health*. 2025;69(7):736–751. <https://doi.org/10.1093/annweh/wxaf036>
- Rozov VY, Pelevin DY, Reutskiy SY, Kundius KD, Vorushylo AO. **The complex influence of external and internal electricity networks on the magnetic field level in residential premises of buildings.** *Electrical Engineering & Electromechanics*. 2025;4:11–19. <https://doi.org/10.20998/2074-272X.2025.4.02>
- Schmid G, Schneeweiss P, Hirtl R, Kainz J, Sauter C, Danker-Hopfe H, Dorn H. **Design and Dosimetric Analysis of a Whole-Body Exposure Setup for Investigating Possible Effects of 50 Hz Magnetic Fields on Sleep and Markers of Alzheimer's Disease.** *Bioelectromagnetics*. 2025;46(6):e70022. <https://doi.org/10.1002/bem.70022>
- Schneeweiss P, Hirtl R, Schmid G. **Low frequency magnetic field induction factors for exposure assessment in the human hand.** *Physics in medicine and biology*. 2025;70(18). <https://doi.org/10.1088/1361-6560/ae0118>
- Zhou M, Kourtiche D, Claudel J, Roth P, Magne I, Deschamps F, Salvi B. **Assessment of Interference in CIEDs Exposed to Magnetic Fields at Power Frequencies: Induced Voltage Analysis and Measurement.** *Bioengineering*. 2025;12(7):677. <https://doi.org/10.3390/bioengineering12070677>
- Zhu K, Yan B. **Migratory Animals-Enlightened Hydrogen-Bonded Organic Framework Nanorods Electrodeposited Nickel-Based Fabrics for Ultrafast and Ultrasensitive Dual-Environmental Magnetic Field Luminescence Responsive Monitoring Both in Air and Water.** *Advanced materials*. 2025;eFIRST-2025-07:e2508676. <https://doi.org/10.1002/adma.202508676>

low frequency – epidemiology (5)

- Elyasi H, Ghanbari Kakavandi M, Almasi A, Seifmanesh S, Ahmadi Dehkiani F, Khosravipour M. **Differential impacts of co-exposures to ELF-EMFs and noise on prostate-specific antigen levels: A longitudinal study.** *Environmental research*. 2025;286(Pt 1):122790. <https://doi.org/10.1016/j.envres.2025.122790>
- Koenig V, Monai M, Christ A, Windpassinger M, Ihra GC, Fochtmann-Frana A, Joestl J. **High Voltage and Train-Surfing Injuries: A 30-Year Retrospective Analysis of High-Voltage Trauma and Its Impact on Cardiac Biomarkers.** *Journal of clinical medicine*. 2025;14(14):4969. <https://doi.org/10.3390/jcm14144969>
- Mohammadi H, Khoddam S, Golbabaei F, Dehghan SF. **Analyzing the impact of occupational exposures on male fertility indicators: A machine learning approach.** *Reproductive toxicology*. 2025;136:108959. <https://doi.org/10.1016/j.reprotox.2025.108959>
- Onyije FM, Dolatkhah R, Olsson A, Bouaoun L, Schuz J. **Risk factors of neuroblastoma: a systematic review and meta-analysis.** *Frontiers in public health*. 2025;13:1576101. <https://doi.org/10.3389/fpubh.2025.1576101>
- Salmon AO, Ledent M, De Clercq EM, Vanhoutte B, Bouland C. **Assessment of Individual Exposure to Multiple Pollutants (Noise, Particulate Matter, and Extremely Low-Frequency Magnetic Fields) Related to Daily Life Microenvironments in the Brussels Capital Region: Protocol for a Cross-Sectional Study.** *JMIR research protocols*. 2025;14:e69407. <https://doi.org/10.2196/69407>

low frequency – human study (3)

- Calderon-Garciduenas L, Cejudo-Ruiz FR, Gonzalez-Maciel A, Reynoso-Robles R, Ramos-Morales A, Perez-Guille BE, Soriano-Rosales RE, Torres-Jardon R. **Cardiovascular damage, arrhythmogenesis and overlapping Alzheimer and Parkinson's diseases and TDP-43 pathology start in pediatric and young adult urban populations: Magnetic ultrafine particulate matter and industrial particles with motion**

behavior play a key role. *Environmental research*. 2025;285(Pt 4):122558.
<https://doi.org/10.1016/j.envres.2025.122558>

Li KH, Guo HR. **Prospective long-term follow-up of patients with idiopathic environmental intolerance attributed to electromagnetic fields after a provocation trial.** *Ecotoxicology and environmental safety*. 2025;303:118944. <https://doi.org/10.1016/j.ecoenv.2025.118944>

Paknahad M, Dehghani A, Khaleghi I, Eghildespour M, Mortazavi G, Mortazavi SMJ. **Microleakage of Amalgam Restorations after Exposure to Electromagnetic Fields of a Commercial Hair Dryer: An Ex-Vivo Study.** *Journal of biomedical physics & engineering*. 2025;15(3):263–270.
<https://doi.org/10.31661/jbpe.v0i0.2210-1551>

low frequency – in vitro study (20)

Alkis ME. **Impact of exposure to extremely low-frequency electromagnetic fields prior to application of X-rays on the viability of cancerous and healthy cells.** *Radiation Physics and Chemistry*. 2026;238:113208.
<https://doi.org/10.1016/j.radphyschem.2025.113208>

Bajtos M, Dang N, Lopez de Mingo I, Keller J, Gurhan H, Janousek L, Barnes F. **The proliferation rates of HT-1080 human fibrosarcoma cells can be accelerated or inhibited by weak static and extremely low frequency magnetic fields.** *Frontiers in public health*. 2025;13:1535155.
<https://doi.org/10.3389/fpubh.2025.1535155>

Bertagna F, Ahmad S, Lewis R, Silva SRP, McFadden J, Huang CL, Matthews HR, Jeevaratnam K. **Electromagnetic fields modulate neuronal membrane ionic currents through altered cellular calcium homeostasis.** *Annals of the New York Academy of Sciences*. 2025;1550(1):273–282.
<https://doi.org/10.1111/nyas.15386>

Bracci M, Lazzarini R, Piva F, Giulietti M, Marinelli Busilacchi E, Rossi E, Di Criscio F, Santarelli L, Poloni A. **Proteomic Characterization of Human Peripheral Blood Mononuclear Cells Exposed to a 50 Hz Magnetic Field.** *International journal of molecular sciences*. 2025;26(13):6035.
<https://doi.org/10.3390/ijms26136035>

Doltchinkova V, Lozanova S, Ivanov A, Kitanova M, Nikolov R, Roumenin C. **Effect of constant magnetic field on methemoglobinemia erythrocytes.** *European Physical Journal-Special Topics*. 2025;eFIRST-2025-07.
<https://doi.org/10.1140/epjs/s11734-025-01753-2>

Font LP, Moya-Gomez A, Kempes H, Lambrichts I, Rigo JM, Brone B, Bronckaers A. **Sinusoidal Extremely Low-Frequency Electromagnetic Stimulation (ELF-EMS) Promotes Angiogenesis In Vitro.** *Biomedicines*. 2025;13(6):1490. <https://doi.org/10.3390/biomedicines13061490>

Ito M, Huang Z, Nomura K, Teranishi M, Zhao F, Mino H, Yoneda M, Tanaka M, Ohno K. **Extremely low-frequency electromagnetic field (ELF-EMF) enhances mitochondrial energy production in NARP cybrids.** *Scientific reports*. 2025;15:24369. <https://doi.org/10.1038/s41598-025-10536-7>

Lee SM, Lee S, Kim KH, Kim D, Park SJ, Kim KH, Lee S, Bae E, Yoo KD, Lee JW, Park JY, Kim YS, Cha RH, Yang SH. **Field direction of static magnetic fields influences kidney fibrosis progression through MAPK signaling and cell cycle alteration.** *Scientific reports*. 2025;15:24841. <https://doi.org/10.1038/s41598-025-09077-w>

Liu MN, Tian XY, Fang WC, Song R, Li F, Wang ZY, Lu GY, Wu N, Li J, Li H. **Magnetogenetics inspired by animal Magnetoreception: DeltaTRPV4(MagR) as a novel magnetogenetic actuator enabling remote neuromodulation of brain circuits.** *Brain stimulation*. 2025;18(5):1455–1469.
<https://doi.org/10.1016/j.brs.2025.07.019>

Ma L, Bao S, Yang X, Liu H, Xiao Y, Lin X, Cui X, Zhao Q, Wang JF, Yan H, Liu Z, Guo Y, Guo J. **Molecular hydrogen mitigates NEMP-induced male reproductive cells apoptosis via scavenging ROS.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-06:1–13. <https://doi.org/10.1080/15368378.2025.2513901>

Mendoza-Mari Y, Stojanovic M, Miulli DE, Agrawal DK. **Microglial Response to Inflammatory Stimuli Under Electromagnetic Field Exposure.** *Archives of clinical and biomedical research*. 2025;9(4):304–315.
<https://doi.org/10.26502/acbr.50170467>

- Mydlkowski R, Maniak K, Grosman-Dziewiszek P, Wiatrak B, Bienkowski P, Gebarowski T. **Apparatus for exposure of cancer cell lines with extremely low frequency (ELF) alternating magnetic field.** *Bulletin of the Polish Academy of Sciences-Technical Sciences*. 2025;73(3):e153429. <https://doi.org/10.24425/bpasts.2025.153429>
- Ren J, Li F, Shen J, Tian L, Pan Y. **GSK-3 β and mTOR Phosphorylation Mediate the Reversible Regulation of Hypomagnetic Field on Adult Neural Stem Cell Proliferation.** *European journal of neuroscience*. 2025;62(2):e70202. <https://doi.org/10.1111/ejn.70202>
- Sincak M, Benediktova K, Adamkova J, Sedlakova-Kadukova J. **Hypomagnetic Field and Its Effect on the Growth and Survival of Microorganisms.** *Microorganisms*. 2025;13(6):1362. <https://doi.org/10.3390/microorganisms13061362>
- Sivelli G, Barakat A, Marable KB, Gruet G, Bitetti SL, Behr B, Lodde V, Luciano AM, Herrera C, Blom M, Grisi M. **Micro magnetic resonance spectroscopy for noninvasive metabolic screening of mammalian embryos and oocytes.** *Proceedings of the National Academy of Sciences of the United States of America*. 2025;122(31):e2424459122. <https://doi.org/10.1073/pnas.2424459122>
- Tekam CKS, Kumari P, Sahi AK, Gundu S, Mahto SK. **Effects of 50 Hz extremely low-frequency magnetic field exposure on proliferative activity in cancer cells: an in vitro study.** *Radiation protection dosimetry*. 2025;eFIRST-2025-09:ncaf099. <https://doi.org/10.1093/rpd/ncaf099>
- Viet HV, Kremnický L, Bereta M, Teplan M. **Experimental Platform for Investigation of Low-Frequency Magnetic Field Effects on Cells.** *Measurement Science Review*. 2025;25(2):83–92. <https://doi.org/10.2478/msr-2025-0011>
- Wan H, Wang W, Zhang Y, Xu C, Zhang J, Li M, Ma K, Wang J, Wang Y, Wang J. **Assembly dynamics of magnetotactic bacterial actin-like protein MamK under shielded geomagnetic fields: In vitro evidence of inhibited filament formation.** *International journal of biological macromolecules*. 2025;320(Pt 2):145863. <https://doi.org/10.1016/j.ijbiomac.2025.145863>
- Zastko L, Makinistian L, Petrovicova P, Tvarozna A, Belyaev I. **Exposure of human lymphocytes to sweeping-frequency ELF MF.** *International journal of radiation biology*. 2025;eFIRST-2025-08:1–10. <https://doi.org/10.1080/09553002.2025.2542322>
- Zhang M, Wang P, Wang H, Wang L, Ding X, Zheng Z, Zhao G. **Mechanism of static magnetic field influencing morphogenesis of *Flavobacterium* sp. m1-14.** *Enzyme and microbial technology*. 2025;191:110714. <https://doi.org/10.1016/j.enzmictec.2025.110714>

low frequency – plant study (13)

- Akdemir Evrendilek G, Yalçın B. **Pulsed Electric Fields-Driven Enhancement of Tomato Seed Quality and Resilience: Improving Germination, Stress Tolerance, and Microbial Disinfection.** *Applied Sciences*. 2025;15(12):6447. <https://doi.org/10.3390/app15126447>
- Ali KA, Junaid M, El-Meligy MA, Dar MA, Altarawneh R, Ul-Haq Z, Khan IU, Mahmoud HA. **Magnetic field treatment as a catalyst for enhanced germination, growth, and biochemical properties of garlic seeds.** *Scientia Horticulturae*. 2025;350:114356. <https://doi.org/10.1016/j.scienta.2025.114356>
- Atik A, Akarca G, Denizkara AJ. **Impact of Applying Magnetic Fields on the Development of Postbiotic Metabolites and Probiotic Microorganisms in Kombucha Tea.** *Food science & nutrition*. 2025;13(7):e70700. <https://doi.org/10.1002/fsn3.70700>
- Chuquizuta T, Lobato C, Zirena Vilca F, Huaman-Castilla NL, Castro W, Castro-Giraldez M, Fito PJ, Chavez SG, Arteaga H. **Impact of Magnetic Biostimulation and Environmental Conditions on the Agronomic Quality and Bioactive Composition of INIA 601 Purple Maize.** *Foods*. 2025;14(12):2045. <https://doi.org/10.3390/foods14122045>
- Cibik GO, Yalcin FS. **Enhancement of germination in soybean (*Glycine max* L. Merrill) seeds by pre-treatment of seeds with magnetic field.** *Chilean Journal of Agricultural & Animal Sciences*. 2025;41(1):91–99. <https://doi.org/10.29393/CHJAAS41-9EGGF20009>

- Gaewsondee T, Chiawchanwattana C, Khaengkan P, Laohavanich J, Vipattanaporn C, Yangyuen S. **Influence of Dynamic Magnetic Field Exposure Duration on the Germination and Growth of Khao Dawk Mali 105 Rice Seed.** *Agronomy*. 2025;15(7):1630. <https://doi.org/10.3390/agronomy15071630>
- Han Z, He P, Geng YH, Manzoor MF, Zeng XA, Hassan S, Afraz MT. **Quantitative Analysis of Ginger Maturity and Pulsed Electric Field Thresholds: Effects on Microstructure and Juice's Nutritional Profile.** *Foods*. 2025;14(15):2637. <https://doi.org/10.3390/foods14152637>
- Hu JH, Han WH, Zhang HJ, Wang NZ, Wu GQ, Zhu QL, Ma FY, Tian HM, Wang YP. **A static magnetic field improves salt tolerance for poplar cuttings by regulating root reactive oxygen species homeostasis.** *Journal of Forestry Research*. 2025;36(1):70. <https://doi.org/10.1007/s11676-025-01859-2>
- Silva IQ, Machado BR, Ferreira TM, Borges JD, Teixeira CMLL, Santos LO. **Carotenoid Production by with Magnetic Field Application.** *Fermentation*. 2025;11(8):487. <https://doi.org/10.3390/fermentation11080487>
- Tao J, Yang Q, Ji S, Sun L, Dai H, Li M, Zhou Q. **Static magnetic field treatment regulates reactive oxygen species metabolism and cell wall metabolism to delay postharvest softening of blueberries.** *Plant physiology and biochemistry*. 2025;229(Pt A):110398. <https://doi.org/10.1016/j.plaphy.2025.110398>
- Urnuksaikhana E, Bold BE, Khurelbaatar L, Bazarvaani A, Mishig-Ochir T. **Effects of Electromagnetic Field on Seed Germination, beta-Amylase Activity, Total Protein Content, Water Uptake, and Growth of Wheat Seedlings (Triticum aestivum).** *Bioelectromagnetics*. 2025;46(5):e70011. <https://doi.org/10.1002/bem.70011>
- Vashisth A, Meena N, Krishanan P, Kundu M. **Influence of pre-sowing exposure of magnetic field on root and yield characteristics of sunflower.** *Acta Physiologiae Plantarum*. 2025;47(9):86. <https://doi.org/10.1007/s11738-025-03833-1>
- Xu XL, Zhou CK, Mei JQ, Mao ZS, Liu D, Ye ZQ, Fang XZ. **Effect of electric field frequency on phytoremediation efficiency and properties of Cd-contaminated soil.** *Environmental Sciences Europe*. 2025;37(1):126. <https://doi.org/10.1186/s12302-025-01177-8>

low frequency – review (3)

- Gao BX, Wang C, Jiang RX, Tian WM. **[Space magnetic environment and circadian rhythm].** *Sheng li xue bao : [Acta physiologica Sinica]*. 2025;77(4):721–730. <https://doi.org/10.13294/j.aps.2025.0072>
- Havens HM, Taylor BK, Lohmann KJ. **Neuromorphic encoding strategies for a noisy magnetic sense.** *Journal of the Royal Society Interface*. 2025;22(227):20240810. <https://doi.org/10.1098/rsif.2024.0810>
- Stam R. **Low frequency magnetic field exposure and neurodegenerative disease: systematic review of animal studies.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-08:1–15. <https://doi.org/10.1080/15368378.2025.2540435>

low frequency – theory/molecular mechanism (12)

- Alejandro MM, Herlinda BJ, Aparicio-Bautista DI, Siddhartha MR, Overduin M, Basurto-Islas G. **Molecular mechanisms associated with the interaction of external electromagnetic fields in protein dynamics and aggregation: a focus on amyloid-beta peptide.** *Progress in biomedical engineering*. 2025;7(3):032010. <https://doi.org/10.1088/2516-1091/adea02>
- Benjamin PL, Gerhards L, Solov'yov IA, Hore PJ. **Magnetosensitivity of Model Flavin-Tryptophan Radical Pairs in a Dynamic Protein Environment.** *Journal of physical chemistry. B*. 2025;129(24):5937–5947. <https://doi.org/10.1021/acs.jpcc.5c01187>
- Binhi V. **Magnetic effects in biology: Crucial role of quantum coherence in the radical pair mechanism.** *Physical Review E*. 2025;112:014409. <https://doi.org/10.1103/n3fs-fsnv>

- Cascone M, Mazzeo P, Cupellini L, Mennucci B. **Multiscale Simulation of Photoinduced Electron Transfer in Cryptochrome 4 from European Robin and Pigeon Indicates a Conserved Dynamics.** *The journal of physical chemistry letters*. 2025;16(34):8877–8884. <https://doi.org/10.1021/acs.jpcllett.5c01814>
- Chandler SA, Gehrckens AS, Shah LMN, Buckton KE, Cao G, Sen N, Zollitsch T, Rodriguez R, Solov'yov IA, Schleicher E, Weber S, Hore PJ, Timmel CR, Mackenzie SR, Benesch JLP. **Light-induced conformational switching and magnetic sensitivity of Drosophila cryptochrome.** *Structure*. 2025;eFIRST-2025-08. <https://doi.org/10.1016/j.str.2025.08.003>
- Gravell J, Murton PDF, Pitcher TL, Henbest KB, Schmidt J, Buffett MM, Moise G, Gehrckens AS, Cubbin DR, Stuhlec A, Antill LM, Pare-Labrosse O, Bassetto M, Saberamoli G, Xu J, Langebrake C, Liedvogel M, Schleicher E, Weber S, Bartolke R, Mouritsen H, Hore PJ, Mackenzie SR, Timmel CR. **Spectroscopic Characterization of Radical Pair Photochemistry in Nonmigratory Avian Cryptochromes: Magnetic Field Effects in GgCry4a.** *Journal of the American Chemical Society*. 2025;147(28):24286–24298. <https://doi.org/10.1021/jacs.4c14037>
- Ilott SI, Pearse CD, Tigg B, Kattnig DR. **Electron hopping in cryptochrome: Implications for radical pair magnetoreception and the role of the fourth tryptophan.** *Journal of chemical physics*. 2025;163(2):024110. <https://doi.org/10.1063/5.0278806>
- Jin Z, Zeng Y, Xie X, Dai Z, Xie Y, Shen J, Liu X, Li J, Wang L, Li Q, Wang F, Fan C, Lv H. **Quantitative Super-Resolution Imaging of On-Origami DNA Conformation and Reactivity Under Electric Fields.** *Angewandte Chemie (International ed. in English)*. 2025;eFIRST-2025-09:e202508159. <https://doi.org/10.1002/anie.202508159>
- Lin N, Zagajowski MJ, Esipova TV, Mani T. **Spin-Correlated Radical Pairs as Magnetic Switches for Controlling Emissive Triplet States via Triplet-Triplet Energy Transfer.** *The journal of physical chemistry letters*. 2025;16(27):6983–6987. <https://doi.org/10.1021/acs.jpcllett.5c01512>
- Oka Y, Quintes F, Yoshikawa Y, Fujiwara M, Maeda K, Weber S, Inoue K. **Direct observation of long-lived radical pair between flavin and guanine in single- and double-stranded DNA-oligomers.** *Communications chemistry*. 2025;8(1):203. <https://doi.org/10.1038/s42004-025-01596-x>
- Xiong C, Kandhan P, Zoltowski BD, Tao P. **Structural Plasticity and Functional Dynamics of Pigeon Cryptochrome 4 as Avian Magnetoreceptor.** *Journal of molecular biology*. 2025;437(20):169233. <https://doi.org/10.1016/j.jmb.2025.169233>
- Xu J, Ameerjan ABP, Hungerland J, Langebrake G, Ravensborg T, Jensen ON, Schmidt J, Bartolke R, Kasahara T, Satish B, Schwigon L, Dedek K, Nolte AW, Liedvogel M, Solov'yov IA, Mouritsen H. **Cryptochrome 4b protein is probably irrelevant for radical pair-based magnetoreception in the European robin.** *Journal of the Royal Society Interface*. 2025;22(229):20250176. <https://doi.org/10.1098/rsif.2025.0176>

Intermediate frequency (3)

intermediate frequency – animal study (0)

intermediate frequency – dosimetry/exposure (2)

- Gomez-Tames J, Tarnaud T, Joseph W, Tanghe E. **Numerical Study on Human Brain Cortical Electrostimulation Assessment During Uniform Magnetic Field Exposure at Intermediate Frequencies.** *IEEE Access*. 2025;13:124955–124961. <https://doi.org/10.1109/ACCESS.2025.3586112>
- Munsi A, Pradhan S, Aditya K. **Advancements in inductive wireless power transfer: A comprehensive review.** *Chinese Journal of Electrical Engineering*. 2025;eFIRST-2025-06. <https://doi.org/10.23919/cjee.2025.000136>

intermediate frequency – epidemiology (0)

intermediate frequency – human study (0)

intermediate frequency – in vitro study (0)

intermediate frequency – plant study (1)

Hu X, Wang H, Jiang Q, Wen P, Hu Y, Tu Z. **Modulating immune reactivity of grass carp parvalbumin via pulsed electric field-induced variation of structural properties.** *Food chemistry*. 2025;493(Pt 3):145916. <https://doi.org/10.1016/j.foodchem.2025.145916>

intermediate frequency – review (0)

intermediate frequency – theory/molecular mechanism (0)

Radiofrequency (137)

radiofrequency – animal study (30)

Almasiova V, Andraskova S, Karaffova V, Hudakova P, Molnar J, Toth S, Holovska K. **The influence of Wi-Fi on the mesonephros in the 9-day-old chicken embryo.** *Veterinary research communications*. 2025;49(4):216. <https://doi.org/10.1007/s11259-025-10777-x>

Altun G, Kaplan S. **Possible effects of melatonin and omega-3 on the obesity-related hypothalamic nuclei of the electromagnetic field-exposed offspring rats: a stereological and immunohistochemical analysis.** *Frontiers in public health*. 2025;13:1583097. <https://doi.org/10.3389/fpubh.2025.1583097>

Bala N, Croft RJ, McIntosh RL, Iskra S, Frankland JV, McKenzie RJ, Deng C. **Characterization of the Core Temperature Response of Free-Moving Rats to 1.95 GHz Electromagnetic Fields.** *Bioelectromagnetics*. 2025;46(5):e70013. <https://doi.org/10.1002/bem.70013>

Bektas H, Bese Akgun BB, Cakir S, Dogu S, Ahnas B. **Protective effects of quercetin against 3.5 GHz RF radiation-induced thyroid dysfunction and oxidative stress in rats.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-07:1–12. <https://doi.org/10.1080/15368378.2025.2528732>

Deniz OG, Altun G, Kaplan S. **Melatonin and omega-3 neuroprotection in prenatal rat spinal cord exposed to 900 MHz electromagnetic field.** *Biomolecules & biomedicine*. 2025;eFIRST-2025-07. <https://doi.org/10.17305/bb.2025.12633>

Dom NC, Dapari R, Halim N, Rahman ATA. **Combined effects of constant temperature and radio frequency exposure on Aedes mosquito development.** *Scientific reports*. 2025;15:30571. <https://doi.org/10.1038/s41598-025-09383-3>

Er H, Basaranlar G, Derin N, Kantar D, Ozen S. **The effects of short-term and long-term 2100 MHz radiofrequency radiation on adult rat auditory brainstem response.** *Open Chemistry*. 2025;23(1):20250173. <https://doi.org/10.1515/chem-2025-0173>

Fu J, Sun Y, Jia H, Yuan H, Zhang X, Zhang W, Cao H, Qin F. **Theaflavin-3,3'-digallate prevents radiofrequency radiation-induced learning and memory impairment in mice via regulating GSK-3 α /GR α /ROR α /BMAL1 expression.** *Food & function*. 2025;16(18):7199–7216. <https://doi.org/10.1039/d4fo04752d>

Gao J, Li X, Hou Y, Li Y, Pang Y, Wu X, Zhao L, Zhang J, Wang H, Wang H, Dong J, Xu X, Peng R, Wang Y, Yao B. **Microwave exposure induced ferroptosis by inhibiting the Nrf2 pathway and affected reproductive function in male mice.** *Ecotoxicology and environmental safety*. 2025;301:118523. <https://doi.org/10.1016/j.ecoenv.2025.118523>

- Gautam R, Jha N, Tomar AK, Nirala JP, Arora T, Rajamani P. **Oxidative stress and testicular damage induced by chronic exposure to 35.5 GHz millimeter wave radiation in male Wistar rats.** *Andrology*. 2025;eFIRST-2025-08. <https://doi.org/10.1111/andr.70107>
- Gunay S, Delen K, Ozkan ET, Kuzay Aksoy D, Sirav Aral B. **Effects of 2100 MHz radio-frequency fields on brain tissues and plasma of normal rats and obese rats.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-06:1–7. <https://doi.org/10.1080/15368378.2025.2513903>
- Holovská K, Andrasková S, Petrovová E, Molnár J, Vince T, Almásiová V. **The effect of Wi-Fi on elastic and collagen fibres in the blood vessel wall of the chorioallantoic membrane.** *Acta Veterinaria Brno*. 2025;94(2):137–144. <https://doi.org/10.2754/avb202594020137>
- Ibrahim SF, Abu Bakar NF, Paranthaman NS, Gan TS, Childs JF, Azhar NA, Zulkefli AF, Ros MFM, Osman K, Fathihah FH. **Testicular Morphological Alterations in 2.45 GHz Wi-Fi Exposed Rat Pups and The Mitigating Effects of Edible Bird Nest.** *Medicine and Health*. 2025;20(2):764–775. <https://doi.org/10.17576/MH.2025.2002.24>
- Ijima E, Nagai A, Li K, Hikage T, Kamizawa N, Hidaka E, Tsuruta Y, Ishitake T, Masuda H. **Histological and inflammatory effects of 26.5 GHz quasi-millimeter wave exposure on rat skin.** *Frontiers in public health*. 2025;13:1580155. <https://doi.org/10.3389/fpubh.2025.1580155>
- İkinci Keleş A, Kaya H, Keleş G, Tümkaya L. **Exposure to an Electromagnetic Field During Adolescence Can Cause Destruction and Pain in Bone Tissue and Cells While Also Triggering New Bone Formation.** *Bratislava Medical Journal*. 2025;126(9):2173–2185. <https://doi.org/10.1007/s44411-025-00217-2>
- Ilgaz NS, Karamazi Y, Emre M, Toyran T, Karaoglan O, Emre T, Donmez Kutlu M, Oksuz Uckayabasi H, Aydin C, Yilmaz MB. **Genotoxic and histopathological effects of 6 GHz radiofrequency electromagnetic radiation on rat liver tissue.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-07:1–12. <https://doi.org/10.1080/15368378.2025.2534381>
- Krasner KY, Butikova EA, Drobot EV, Kanygin NV, Levchenko ID, Popik VM, Kolomeets DA, Solovieva OI, Tolstikova TG, Zavjalov EL, Chernykh VV, Trunov AN, Kanygin VV. **Assessment of the Safety of THz Irradiation on the Morphofunctional Characteristics of Rabbit Corneas.** *Bulletin of experimental biology and medicine*. 2025;179(2):266–269. <https://doi.org/10.1007/s10517-025-06471-2>
- Li YZ, Zhou L, Cheng J, Williams JP, Wang PC, An JX. **Low-intensity millimeter waves ameliorate cognitive impairment induced by chronic REM sleep deprivation in rats by regulating CaMKII-CREB-BDNF pathway.** *Neuroscience*. 2025;581:83–94. <https://doi.org/10.1016/j.neuroscience.2025.07.002>
- Migdal P, Plotnik M, Bienkowski P, Berbec E, Latarowski K, Bialecka N, Murawska A. **The Influence of an Electromagnetic Field at a Radiofrequency of 900 MHz on the Behavior of a Honey Bee.** *Agriculture*. 2025;15(12):1266. <https://doi.org/10.3390/agriculture15121266>
- Oruc S, Gunay S, Sirav Aral B, Erden Y, Ozkut MM, Ates K, Ozdemir G, Eraslan E. **Combined effects of agomelatine and 2600 MHz radiofrequency field on inflammation induced by chronic lipopolysaccharide administration.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-08:1–10. <https://doi.org/10.1080/15368378.2025.2545871>
- Pei YH, Gao H, Li J, Li J, Hou ZH, Han XC. **Effect of the radiation emitted from a cell phone on T lymphocytes in mice.** *Radiation Effects and Defects in Solids*. 2025;eFIRST-2025-07. <https://doi.org/10.1080/10420150.2025.2526402>
- Safaeinezhad A, Mousapour E, Ahmadi AKB, Ebrahimi S, Rahimi K, Rezaie A, Dehvari M, Givi ME, Sasani A. **Effects of coenzyme Q10 on sperm parameters and pathological changes induced by Wi-Fi waves in the testicular tissue of rats.** *Annals of Medicine and Surgery*. 2025;87(7):4073–4079. <https://doi.org/10.1097/MS9.00000000000003340>
- Shamsaei A, Mohammadpour I, Mohammadi Z, Asgari Q. **Prophylactic Effect of Microwave Radiation on Toxoplasma gondii Tachyzoites of RH Strain: A Method for Partial Immunization in BALB/c Mice.** *Journal of parasitology research*. 2025;2025(1):1666892. <https://doi.org/10.1155/japr/1666892>

- Small A, Jenson I, Fiszon B, Neindre PL, Phillips A, McLean D, McLean J, Kalinowski T, Ralph J. **Tissue integrity impacts of application of 160-200 kJ of 915 MHz microwave energy, using the DTS: Diathermic Syncope(R) system, to the forehead of cattle, and alignment with the requirements of religious slaughter markets.** *Veterinary and animal science*. 2025;29:100464. <https://doi.org/10.1016/j.vas.2025.100464>
- Treder M, Gluck M, England SJ, Traynor KS. **Radiofrequency electromagnetic fields reduce bumble bee visitation to flowers.** *Environmental pollution*. 2025;384:126836. <https://doi.org/10.1016/j.envpol.2025.126836>
- Xu J, Wang X, Li M, Zhang L, Zhao X, Dong G, Wang C. **Multi-frequency electromagnetic radiation promoted hepatic lipid metabolism via the adiponectin pathway in mice.** *Ecotoxicology and environmental safety*. 2025;303:119016. <https://doi.org/10.1016/j.ecoenv.2025.119016>
- Zhang M, Lv Z, Zhao L, Zeng Q, Wu Y, Zhou J, Xi J, Pei X, Wang H, Li C, Yue W. **Single-cell analysis reveals the spatiotemporal effects of long-term electromagnetic field exposure on the liver.** *Frontiers in cell and developmental biology*. 2025;13:1579121. <https://doi.org/10.3389/fcell.2025.1579121>
- Zhang M, Wang Y, Zou Y, Zhi W, Zhao X, Niu J, Du L, Ma L, Wang L. **Research on the Correlation between BDNF Val76Met Polymorphism and Susceptibility to Changes of Cognitive Function in Rats Induced by Microwave Radiation.** *Neurochemical research*. 2025;50(4):238. <https://doi.org/10.1007/s11064-025-04480-1>
- Zhao J, Yue H, Wang K, Sun Y, Zhao L, Wang H, Zhang J, Xu X, Yao B, Dong J, Wang H, Zuo Z, Peng R. **Disruption of the linear relationship between recognition memory and local functional connectivity of left perirhinal cortex in rat after acute 2.856 GHz microwave exposure.** *Brain research*. 2025;1864:149816. <https://doi.org/10.1016/j.brainres.2025.149816>
- Zhu P, Xie C, Li K, Shu F, Li L, Su Z, Xue Y. **Selective and controllable mechanism of the temperature field in skin tissue under radiofrequency heating: finite element analysis and ex-vivo pig skin experiments.** *Journal of thermal biology*. 2025;131:104183. <https://doi.org/10.1016/j.jtherbio.2025.104183>

radiofrequency – dosimetry/exposure (54)

- Acharjee J, Uzair M, Phakaew T, Kaewcharoen A, Ali J, Mandal K, Akkaraekthalin P, Chalermwisutkul S. **Dual-Broadband Metasurface Printed on Mobile Phone Back Cover for Enhanced Antenna Performance and SAR Reduction.** *Wireless Personal Communications*. 2025;eFIRST-2025-08. <https://doi.org/10.1007/s11277-025-11803-6>
- Adda S, Franci D, Marsico G, Pasquino N, Pavoncello S. **Estimation of Maximum RF-EMF Exposure by Single-User MIMO mm-Wave 5G Systems.** *IEEE Transactions on Instrumentation and Measurement*. 2025;74:8005410. <https://doi.org/10.1109/tim.2025.3593548>
- Belackova L, Veludo AF, Aminzadeh R, Van Bladel H, Griffon V, Cardis E, Dongus S, Eeftens M, Guxens M, Joseph W, de Llobet P, Mazet P, Van Torre P, Thielens A, Vermeulen R, Wiart J, Roosli M, Huss A. **Temporal Change of Outdoor RF-EMF levels in four European Countries: a Microenvironmental Measurement Study.** *Environmental research*. 2025;285(Part 1):122315. <https://doi.org/10.1016/j.envres.2025.122315>
- Berisha D, Jerliu A, Ibrani M. **ML Algorithms Analysis and Prediction of Broadband Electric Field Levels in Telecommunication Systems Environment.** *Telecommunication Systems*. 2025;88(3):82. <https://doi.org/10.1007/s11235-025-01314-x>
- Betzalel N, Feldman Y, Ben Ishai P. **The modeling of the interaction of pulsed 5G/6G signals and the fine structure of human skin.** *Scientific reports*. 2025;15:28651. <https://doi.org/10.1038/s41598-025-13777-8>
- Calderon C, Addison D, Peyman A. **In-Situ Measurements of Radiofrequency Electromagnetic Fields Measurements Around 5G Macro Base Stations in the UK.** *Bioelectromagnetics*. 2025;46(5):e70012. <https://doi.org/10.1002/bem.70012>
- Chen L, Elzanaty A, Kishk MA, Zhang Y-JA. **Joint Coverage and Electromagnetic Field Exposure Analysis in Downlink and Uplink for RIS-Assisted Networks.** *IEEE Transactions on Wireless Communications*. 2025;eFIRST-2025-06:1–1. <https://doi.org/10.1109/twc.2025.3580603>

- Chiaraviglio L, Montenero M, Lodovisi C, Salsano S, Mayer A, Lungaroni P, Blefari-Melazzi N, Basset L, Lo Duca M, Ciciarelli T, Lorenzi L, Trucchi D, Giuliani R, Di Salvatore G, Battistini M, Musi AM, Franci D, Pavoncello S, Coltellacci S, Brinciotti E, Elzanaty A, Alouini MS. **Measuring 5G Exposure From Multiple Terminals and Base Station in Standalone FWA Networks.** *IEEE Access.* 2025;13:87438–87461. <https://doi.org/10.1109/Access.2025.3568246>
- Chitnis N, Karimi F, Kuhn S, Fallahi A, Christ A, Kuster N. **Traceable Assessment of the Absorbed Power Density of Body Mounted Devices at Frequencies Above 10 GHz.** *Bioelectromagnetics.* 2025;46(6):e70018. <https://doi.org/10.1002/bem.70018>
- Choudhary R, Kumar, Mishra S. **Thermal Impact of Chronic Exposure to High-Frequency Non-ionizing EM Radiation on Avian Skin: A Theoretical Approach.** *Indian Journal of Pure & Applied Physics.* 2025;63(6):536–543. <https://doi.org/10.56042/ijpap.v63i6.19022>
- de F. H. Silva RQ, Rodrigues MEC, Pinheiro FSR, da Silva GS, da CMM, Pinto LS, Mendonca HB, de Sousa VA, Jr. **A novel approach for assessments of radiofrequency electromagnetic fields exposure in buildings near telecommunication infrastructure.** *Science of the total environment.* 2025;992:179853. <https://doi.org/10.1016/j.scitotenv.2025.179853>
- Deng CZ, Wu QL, Wu T. **Research on the Classification of Electromagnetic Radiation Safety Levels of Mobile Communication Terminals Using Unsupervised Learning Models.** *IEEE Access.* 2025;13:117582–117593. <https://doi.org/10.1109/ACCESS.2025.3585928>
- Deprez K, Stroobandt B, Veludo AF, Vecsei Z, Necz PP, Politanski P, Verloock L, Polanska K, Thuroczy G, Roosli M, Plets D, Joseph W. **5G RF EMF Spectral Exposure Assessment in Four European Countries.** *Bioelectromagnetics.* 2025;46(6):e70019. <https://doi.org/10.1002/bem.70019>
- Dimitrov Z, Yalamov T. **Machine Learning Techniques for Post-Processing Electromagnetic Exposure Simulations.** *IEEE Antennas and Wireless Propagation Letters.* 2025;eFIRST-2025-06:1–5. <https://doi.org/10.1109/lawp.2025.3583189>
- Famoriji OJ, Shongwe T. **Machine Learning Approach for Ground-Level Estimation of Electromagnetic Radiation in the Near Field of 5G Base Stations.** *Applied Sciences.* 2025;15(13):7302. <https://doi.org/10.3390/app15137302>
- Foster KR, Laakso I, Balzano Q. **Standards: Exposure Limits for Brief High Intensity Pulses of Radiofrequency Energy Between 6 and 300 GHz.** *IEEE Access.* 2025;13:134648–134654. <https://doi.org/10.1109/access.2025.3592532>
- Fu W, Colombi D, He S, Zhekov SS. **Human Proximity Detection and Power Control Based on Antenna Sensing for EMF Touch Compliance of Indoor Base Stations.** *IEEE Transactions on Antennas and Propagation.* 2025;eFIRST-2025-09:1–1. <https://doi.org/10.1109/tap.2025.3603846>
- Gajsek P, Apostolidis C, Plets D, Samaras T, Valic B. **EMF Exposure of Workers Due to 5G Private Networks in Smart Industries.** *Electronics.* 2025;14(13):2662. <https://doi.org/10.3390/electronics14132662>
- Gallucci S, Benini M, Bonato M, Galletta V, Chiaramello E, Fiocchi S, Tognola G, Parazzini M. **Impact of Anthropomorphic Shape and Skin Stratification on Absorbed Power Density in mmWaves Exposure Scenarios.** *Sensors.* 2025;25(14):4461. <https://doi.org/10.3390/s25144461>
- Gandam PJ, Iyyanki M. **Environmental Pollution: Statistical Approach on Mobile Tower Radiation.** *Journal of biomedical physics & engineering.* 2025;15(3):231–238. <https://doi.org/10.31661/jbpe.v0i0.2402-1728>
- Gryz K, Karpowicz J, Zradzinski P. **Modeling Radiofrequency Electromagnetic Field Wearable Distributed (Multi-Location) Measurements System for Evaluating Electromagnetic Hazards in the Work Environment.** *Sensors.* 2025;25(15):4607. <https://doi.org/10.3390/s25154607>
- Gu Y, Hay DZ, van der Weide DW. **3D Bio-printed, Perfusion-Ready Skin Phantoms at Microwave Frequencies.** *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology.* 2025;eFIRST-2025-08. <https://doi.org/10.1109/JERM.2025.3591576>
- Guo ZW, Zhang Y, Meng JJ. **Experimental Study on the Explosion-Proof Safety Thresholds of RF Electromagnetic Energy in Typical 5G Frequency Bands.** *Journal of Electromagnetic Engineering and Science.* 2025;25(3):291–297. <https://doi.org/10.26866/jees.2025.3.r.299>

- Huo S, Song Y, Duffy A, Bai J. **Uncertainty Quantification of Human Electromagnetic Exposure from Mobile Phone Antenna Based on Migration-CoKriging.** *IEEE Transactions on Antennas and Propagation*. 2025;eFIRST-2025-07:1–1. <https://doi.org/10.1109/tap.2025.3590080>
- Jovanovic D, Krasic D, Cvetkovic N, Stankovic V, Zivaljevic D, Petkovic B. **Effect of Titanium Mandible Implant on the Electric Field and SAR Distribution Caused by Mobile Phone Within the User's Head.** *Electronics*. 2025;14(11):2096. <https://doi.org/10.3390/electronics14112096>
- Keun J, Jin T, Jin J, Choo H. **Analysis of High-Power Radar Propagation Environments Around the Test Site.** *Applied Sciences*. 2025;15(13):7305. <https://doi.org/10.3390/app15137305>
- Kim JH, Seong HC, Lee JH, Kim K, Yu BYGY, Bang J. **A Study on Efficient Evaluation Methods for Electromagnetic Exposure to the Human Body from Electronic Article Surveillance Systems.** *Journal of Electrical Engineering and Technology*. 2025;eFIRST-2025-08. <https://doi.org/10.1007/s42835-025-02374-4>
- Kushiya Y, Nagaoka T. **Numerical Calculation of Whole-Body Exposure to Beams From mmWave Base Stations Using Superposition of Spherical Waves.** *IEEE Access*. 2025;13:154021–154030. <https://doi.org/10.1109/access.2025.3601980>
- Liu Z, Cui Y, Wang Y, Peng Y, Yu X, Song L, Su D. **Conformal and Distributed Monitoring of Electromagnetic Emission Enabled by RFID Backscattering and Colorimetric Visualization.** *IEEE Sensors Journal*. 2025;eFIRST-2025-08:1–1. <https://doi.org/10.1109/jsen.2025.3593496>
- Malay IM, Matveev AI, Perepelkin VA, Chirkov IP. **Development of a system to ensure the uniformity of measurements of the power of electromagnetic oscillations in the millimeter-wave region.** *Measurement Techniques*. 2025;67(12):914–922. <https://doi.org/10.1007/s11018-025-02413-6>
- Malhotra S, Sharma M. **Design and analysis of CPW-fed multiband antenna for bluetooth and X-band applications with SAR analysis on human head phantom.** *Wireless Networks*. 2025;31(6):4033–4045. <https://doi.org/10.1007/s11276-025-03982-8>
- Mallik M, Schampheleer J, Clavier L, Deruyck M. **Fast Field Strength Prediction Using Modern Machine Learning in European Cities From Few RF-EMF Measurements: A Neural Tangent Kernel Perspective.** *IEEE Access*. 2025;13:131003–131014. <https://doi.org/10.1109/access.2025.3589492>
- Maloku H, Fazliu ZL, Dobruna J, Ibrani M. **A Measurement-Based Trade-Off Analysis of EMF Exposure Levels and QoS in Mobile Networks.** *Ieee Access*. 2025;13:94354–94369. <https://doi.org/10.1109/Access.2025.3574368>
- Morimoto R, Kodera S, Kobayashi Y, Miwa K, Hirata A. **Conformity Assessment of Human Exposed to Radiation From Millimeter-Wave Vehicles Radars.** *IEEE Journal of Microwaves*. 2025;5(4):793–803. <https://doi.org/10.1109/jmw.2025.3580722>
- Muramatsu D, Amano K. **Ambient Electromagnetic Wave Energy Harvesting Using Human Body Antenna for Wearable Sensors.** *Sensors*. 2025;25(15):4689. <https://doi.org/10.3390/s25154689>
- Najera A, Villaescusa-Tebar A, Gonzalez-Rubio J, Garcia-Pardo C. **Dual Evaluation and Spatial Analysis of RF-EMF Exposure in 5G: Theoretical Extrapolations and Direct Measurements.** *Bioelectromagnetics*. 2025;46(6):e70020. <https://doi.org/10.1002/bem.70020>
- Nájera A, Sánchez-Montero R, González-Rubio J, Guillén-Pina J, Chocano-del-Cerro R, López-Espí PL. **Comparison Between Broadband and Personal Exposimeter Measurements for EMF Exposure Map Development Using Evolutionary Programming.** *Applied Sciences*. 2025;15(13):7471. <https://doi.org/10.3390/app15137471>
- Osei S, Quarshie E, Azah CK, Fuseini AR, Dogbey R, Deatanyah P, Hagan GB, Modupeh Hodasi JA, Sam F, Amoako JK. **Effect of elevation on cumulative radiofrequency exposure from multiple communication towers.** *Radiation protection dosimetry*. 2025;201(10):701–708. <https://doi.org/10.1093/rpd/ncaf068>
- Park JH, Yun SH, Lee MQ. **EMF Exposure Application Using the Chamber of a Coaxial Line for 433-MHz ISM Band.** *IEEE Microwave and Wireless Technology Letters*. 2025;eFIRST-2025-08. <https://doi.org/10.1109/LMWT.2025.3597414>

- Pasquino N, Solmonte N, Djuric N, Kljajic D, Djuric S. **Cluster Analysis of RF-EMF Exposure to Detect Time Patterns in Urban Environment: A Model-Based Approach.** *IEEE Access.* 2025;13:118724–118732. <https://doi.org/10.1109/access.2025.3586905>
- Ruijie P, Sali A, Li L, Mohyedin MZ, Qahtan S. **Evaluation of Personal Radiation Exposure from Wireless Signals in Indoor and Outdoor Environments.** *IEEE Access.* 2025;13:106489–106510. <https://doi.org/10.1109/access.2025.3579085>
- Sabri MHM, Ahmad MR, Azami MAMN, Abd Aziz MZA, Takayanagi Y, Morimoto T, Baharin SAS. **Electromagnetic field radiation between 1 and 10 GHz emitted by lightning flashes from tropical thunderstorms.** *Measurement.* 2025;256:118418. <https://doi.org/10.1016/j.measurement.2025.118418>
- Schoenfelder T, Kindl V, Frivaldsky M. **Design issues of a passive shielded WPT prototype with regard to safety limits against EM radiation.** *Results in Engineering.* 2025;27:106490. <https://doi.org/10.1016/j.rineng.2025.106490>
- Su XR, Huang WC, Cho J, Paek J, Hwang C. **Component Level EM Emission Assessment and Management for RF Desensitization.** *IEEE Transactions on Electromagnetic Compatibility.* 2025;67(2):578–586. <https://doi.org/10.1109/Temc.2025.3539591>
- Villaescusa-Tebar A, Garcia-Pardo C. **Assessment of 5G RF-EMF Exposure During Large-Scale Public Events via Field Measurements.** *IEEE Access.* 2025;13:150489–150497. <https://doi.org/10.1109/access.2025.3602263>
- Wang HY, Foley SE, Zhou H. **Asymptotic Solution for Skin Heating by an Electromagnetic Beam at an Incident Angle.** *Electronics.* 2025;14(15):3061. <https://doi.org/10.3390/electronics14153061>
- Wang S, Lu M. **Assessment of RF Electromagnetic Exposure to Car Driver from Monopole Array Antennas in V2V Communications Considering Thermal Characteristics.** *Sensors.* 2025;25(10):3247. <https://doi.org/10.3390/s25103247>
- Yang W, Xie J. **A Practical Model for Accurate Assessment of Indoor Electromagnetic Exposure from Outdoor Base Stations with Fresnel-Kirchhoff Diffraction.** *IEEE Electromagnetic Compatibility Magazine.* 2025;14(2):59–66. <https://doi.org/10.1109/memc.2025.11134170>
- Ye Y, You L, Xu H, Elzanaty A, Wong K-K, Gao X. **Specific Absorption Rate-Aware Multiuser MIMO Assisted by Fluid Antenna System.** *IEEE Transactions on Wireless Communications.* 2025;eFIRST-2025-07:1–1. <https://doi.org/10.1109/twc.2025.3586659>
- Zahid M, Amin Y. **Specific Absorption Rate Analysis of Wideband Multiple-Input Multiple-Output Antennas for Upper Mid-Band LTE 46/47 and n102 Future Generation Applications.** *Telecom.* 2025;6(2):22. <https://doi.org/10.3390/telecom6020022>
- Zakaria AA, Allam A, Abdel-Rahman AB. **Microwave-Based Non-Invasive Blood Glucose Sensors: Key Design Parameters and Case-Informed Evaluation.** *IEEE Access.* 2025;13:154695–154711. <https://doi.org/10.1109/access.2025.3598618>
- Zheng C, Zhou G, Tao QY, Hu JY, Jiang JH. **Investigation on the Effect Mechanism of the Human Body on the Performance of Fabric-Based Antenna for RF Energy Harvesting.** *Journal of Electronic Materials.* 2025;54(8):6912–6927. <https://doi.org/10.1007/s11664-025-12092-2>
- Zheng J, Zhang Y, Diao Y, Shi D. **Assessment of spatial-average absorbed power density and peak temperature rise in skin model under localized electromagnetic exposure.** *Radiation protection dosimetry.* 2025;eFIRST-2025-08:ncaf096. <https://doi.org/10.1093/rpd/ncaf096>
- Zradzinski P, Karpowicz J, Gryz K. **The Parametrization of Electromagnetic Emissions and Hazards from a Wearable Device for Wireless Information Transfer with a 2.45 GHz ISM Band Antenna.** *Applied Sciences.* 2025;15(12):6602. <https://doi.org/10.3390/app15126602>

radiofrequency – epidemiology (8)

- Baldini GM, Lot D, Ferri D, Montano L, Tartagni MV, Malvasi A, Lagana AS, Palumbo M, Baldini D, Trojano G. **Does Electromagnetic Pollution in the ART Laboratory Affect Sperm Quality? A Cross-Sectional Observational Study.** *Toxics*. 2025;13(6):510. <https://doi.org/10.3390/toxics13060510>
- Dev M, Kumar M, Saha D. **How Do Information and Communication Technologies (ICTs) Affect National Well-Being? The Contrasting Influence of Mobile Phones and Household Computers.** *Social Indicators Research*. 2025;eFIRST-2025-07. <https://doi.org/10.1007/s11205-025-03671-1>
- Frank JW. **Epidemiological criteria for causation applied to human health harms from RF-EMF exposure: Bradford Hill revisited.** *Frontiers in public health*. 2025;13:1559868. <https://doi.org/10.3389/fpubh.2025.1559868>
- Pal S, Paladhi P, Dutta S, Ghosh P, Chattopadhyay R, Ghosh S. **Men with genetic predisposition face greater fertility challenges when exposed to electromagnetic radiation.** *Molecular biology reports*. 2025;52(1):773. <https://doi.org/10.1007/s11033-025-10882-9>
- Sailo L, Laldinpuii, Zosangzuali M, Weller S, Varte CL, Tochhawng L, McCredde JE, Zothansiam. **Greater prevalence of symptoms associated with higher exposures to mobile phone base stations in a hilly, densely populated city in Mizoram, India.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-06:1–20. <https://doi.org/10.1080/15368378.2025.2513900>
- Setia MS, Natesan R, Samant P, Mhapankar S, Kumar S, Singh IV, Nair A, Seth B. **Radiofrequency Electromagnetic Field Emissions and Neurodevelopmental Outcomes in Infants: A Prospective Cohort Study.** *Cureus*. 2025;17(7):e87671. <https://doi.org/10.7759/cureus.87671>
- Zhang J, Zou J, He Y, Shen J, Jing K, An R, Wang Z, Yao X, Ren C, Xia Y. **Mobile phone use characteristics, genetic predisposition and the risk of Parkinson's disease: a prospective cohort study.** *Age and ageing*. 2025;54(5):afaf143. <https://doi.org/10.1093/ageing/afaf143>
- Zhang L, Muscat JE. **Trends in Malignant and Benign Brain Tumor Incidence and Mobile Phone Use in the U.S. (2000-2021): A SEER-Based Study.** *International journal of environmental research and public health*. 2025;22(6):933. <https://doi.org/10.3390/ijerph22060933>

radiofrequency – human study (7)

- Bok J, Kim ES, Ha J, Lee DM, Ahn BJ, Lee SW, Cho SH, Kim NY, Jang Y. **Non-contact radiofrequency stimulation to the olfactory nerve of human subjects.** *APL bioengineering*. 2025;9(3):036112. <https://doi.org/10.1063/5.0275613>
- Sauter C, Dorn H, Bueno-Lopez A, Eggert T, Schmid G, Danker-Hopfe H. **Effects of radiofrequency electromagnetic fields on cognitive function in elderly subjects (60+ years)-Results of an experimental randomized sham controlled double-blind cross-over study in women and in men.** *Environmental research*. 2025;285(Pt 3):122479. <https://doi.org/10.1016/j.envres.2025.122479>
- Sonzogni L, Al-Choboq J, Combemale P, Massardier-Pilonchery A, Bouchet A, May P, Dore JF, Debouzy JC, Bourguignon M, Drean YL, Foray N. **Skin Fibroblasts from Individuals Self-Diagnosed as Electrosensitive Reveal Two Distinct Subsets with Delayed Nucleoshuttling of the ATM Protein in Common.** *International journal of molecular sciences*. 2025;26(10):4792. <https://doi.org/10.3390/ijms26104792>
- Sousouri G, Eicher C, D'Angelo RM, Billecocq M, Fussinger T, Studler M, Capstick M, Kuster N, Achermann P, Huber R, Landolt HP. **5G radio-frequency-electromagnetic-field effects on the human sleep electroencephalogram: A randomized controlled study in CACNA1C genotyped volunteers.** *NeuroImage*. 2025;317:121340. <https://doi.org/10.1016/j.neuroimage.2025.121340>
- Vaupotic N, Grellier J, Martin L, Panicello CD, Goszczynska E, Kojimahara N, Polanska K, Bauer O, Mori H, Yamaguchi-Sekino S, Guxens M, White MP. **5G technology, health and society: misconceptions, blind spots and insights from experts, non-experts, and self-identified electrosensitive individuals.** *Journal of Risk Research*. 2025;28(5):446–470. <https://doi.org/10.1080/13669877.2025.2512074>

Verrender A, Manley J, Wallace NK, Loughran SP, Croft RJ. **Looking for Biomarkers Which May Explain Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields (IEI-EMF): Does RF-EMF Exposure Influence Salivary Cortisol Response?** *Bioelectromagnetics*. 2025;46(6):e70021. <https://doi.org/10.1002/bem.70021>

Verrender A, Wallace NK, Loughran SP, Wallace C, Beange J, Croft RJ. **What is the effect of alarmist media and radiofrequency electromagnetic field (RF-EMF) exposure on salivary cortisol and non-specific symptoms?** *Applied psychology. Health and well-being*. 2025;17(3):e70044. <https://doi.org/10.1111/aphw.70044>

radiofrequency – in vitro study (12)

Angelova B, Paunov M, Kitanova M, Atanasova G, Atanasov N. **Investigation of the Effects of 2.45 GHz Near-Field EMF on Yeast.** *Antioxidants*. 2025;14(7):820. <https://doi.org/10.3390/antiox14070820>

Antonyan AP, Shahinyan MA, Mikaelyan MS, Karapetyan AH, Kalantaryan VP, Vardevanyan PO. **Comparative study of spectral properties of the bovine serum albumin complexes with acridine orange and methylene blue under the effect of millimeter range electromagnetic waves.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-09:1–11. <https://doi.org/10.1080/15368378.2025.2558669>

Bo W, Che R, Jia F, Sun K, Liu Q, Guo L, Zhang X, Gong Y. **Study on the Effect of the Envelope of Terahertz Unipolar Stimulation on Cell Membrane Communication-Related Variables.** *Research*. 2025;8:0755. <https://doi.org/10.34133/research.0755>

Bodin R, Godin L, Mougin C, Lecomte A, Larrigaldie V, Feat-Vetel J, Meresse S, Montecot-Dubourg C, Marcelo P, Mortaud S, Villegier AS. **Altered development in rodent brain cells after 900 MHz radiofrequency exposure.** *Neurotoxicology*. 2025;111:103312. <https://doi.org/10.1016/j.neuro.2025.103312>

Cantu JC, Echchgadda I, Butterworth JW, Payne JA, Johnson LR, Freeman DA, Williams WC, Hoff BW, Thomas RJ, Roach WP, Ibey BL. **Investigation of Viral Inactivation by High Peak Power Microwave (HPPM) Exposure in Solution.** *Bioelectromagnetics*. 2025;46(6):e70015. <https://doi.org/10.1002/bem.70015>

Haidar J, Nabos P, Orlacchio R, Hurtier A, de Gannes FP, Rambert J, Cario-Andre M, Moisan F, Rezvani HR, Lagroye I, Leveque P, Arnaud-Cormos D, Percherancier Y. **Impact of in vitro exposure to 5G-modulated 3.5 GHz fields on oxidative stress and DNA repair in skin cells.** *Scientific reports*. 2025;15:31214. <https://doi.org/10.1038/s41598-025-15090-w>

Nishioka A, Azma T, Mieda T, Mio Y. **Effects of Pulsed Radiofrequency Current and Thermal Condition on the Expression of beta-Endorphin in Human Monocytic Cells.** *NeuroSci*. 2025;6(3):67. <https://doi.org/10.3390/neurosci6030067>

Pachhapure S, Mufida A, Wei Q, Choi JS, Jang BC. **Mitigation of 3.5 GHz Electromagnetic Field-Induced BV2 Microglial Cytotoxicity by Polydeoxyribonucleotide.** *Current Issues in Molecular Biology*. 2025;47(6):386. <https://doi.org/10.3390/cimb47060386>

Sannino A, Allocca M, Scarfi MR, Romeo S, Peluso V, Panariello G, Schettino F, Chirico G, Zeni O. **Exposure to 26.5 GHz, 5G modulated and unmodulated signal, does not affect key cellular endpoints of human neuroblastoma cells.** *Scientific reports*. 2025;15:20614. <https://doi.org/10.1038/s41598-025-04834-3>

Sun L, Wang L, She S, Zuo J, He M. **Cytochrome c-mediated mitochondrial apoptosis activation underpins THz wave-induced melanoma cell death.** *International journal of biological macromolecules*. 2025;321(Part 1):146073. <https://doi.org/10.1016/j.ijbiomac.2025.146073>

Tsuji G, Yamaguchi Y, Oki M. **0.46 Terahertz wave irradiation inhibit transcription reaction in liposomes.** *Scientific reports*. 2025;15(1):18729. <https://doi.org/10.1038/s41598-025-03869-w>

Wang H, Zou W, Ding C, Cao Y. **Activating Transcription Factor 4 regulation of radiofrequency radiation-induced ferroptosis in osteoblasts.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-08:1–15. <https://doi.org/10.1080/15368378.2025.2547799>

radiofrequency – plant study (5)

- Gou WQ, Meng K, Chen JL, Deng L, Ming J, Yi LH, Zeng KF, Wang WJ. **Effects of radio frequency treatment on postharvest quality of *Agaricus bisporus*: synergistic regulation of sucrose and fatty acid metabolism key pathways and physiological responses.** *Postharvest Biology and Technology*. 2025;230:113835. <https://doi.org/10.1016/j.postharvbio.2025.113835>
- Keller J, Geier U, Tran NT. **In-Depth Analysis of Chlorophyll Fluorescence Rise Kinetics Reveals Interference Effects of a Radiofrequency Electromagnetic Field (RF-EMF) on Plant Hormetic Responses to Drought Stress.** *International journal of molecular sciences*. 2025;26(15):7038. <https://doi.org/10.3390/ijms26157038>
- Paunov M, Angelova B, Goltsev V, Atanasova G, Atanasov B, Atanasov N, Kouzmanova M. **Electromagnetic Field Used in Precision Agriculture Does Not Induce Long-term Effects in Wheat and Maize.** *Proceedings of the Bulgarian Academy of Sciences*. 2025;78(7):1083–1093. <https://doi.org/10.7546/crabs.2025.07.15>
- Shah Y, Zhou X, Tang J, Takhar PS. **The Effect of Conventional and Microwave Frying on the Quality Characteristics of French Fries.** *Journal of food science*. 2025;90(8):e70441. <https://doi.org/10.1111/1750-3841.70441>
- Sharma A, Bala N, Sharma M, Katnoria JK, Bahel S. **Study on evaluation of effects of electromagnetic radiation on pollen viability in some commonly occurring plant species following different staining methods.** *Protoplasma*. 2025;eFIRST-2025-08. <https://doi.org/10.1007/s00709-025-02093-7>

radiofrequency – review (16)

- Dudzinska M, Prus B, Bacior S. **Artificial radiation pollution in the Anthropocene: Human causality and responsibility.** *Anthropocene Review*. 2025;eFIRST-2025-07. <https://doi.org/10.1177/20530196251351604>
- Gao A, Dong G, Wang C. **Review of the biological effects due to high-power microwaves exposure.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-09:1–20. <https://doi.org/10.1080/15368378.2025.2547806>
- Gerhards L, Deser A, Kattnig DR, Matysik J, Solov'yov IA. **Weak Radiofrequency Field Effects on Biological Systems Mediated through the Radical Pair Mechanism.** *Chemical reviews*. 2025;125(17):8051–8088. <https://doi.org/10.1021/acs.chemrev.5c00178>
- Goryanin I, Ivanov Y, Damms B, Vesnin S, Shevelev O, Goryanin I. **Exploring the interface between quantum biology, microwave technology, and neuroscience.** *Drug discovery today*. 2025;30(7):104408. <https://doi.org/10.1016/j.drudis.2025.104408>
- Hosseini MM, Masoumian Hosseini ST, Haghighi E, Qayumi K, Ebrahimipour H, Pourabbasi A, Koohpaei A, Alizadeh M, Shafiei Z. **The revolutionary impact of 6G technology on empowering health and building a smart society: A scoping review.** *Computers in biology and medicine*. 2025;194:110496. <https://doi.org/10.1016/j.compbiomed.2025.110496>
- Jeong N, Gan Y, Kong L. **Emerging non-invasive microwave and millimeter-wave imaging technologies for food inspection.** *Critical reviews in food science and nutrition*. 2025;65(17):3302–3313. <https://doi.org/10.1080/10408398.2024.2364225>
- Lin XQ. **3GPP Evolution from 5G to 6G: A 10-Year Retrospective.** *Telecom*. 2025;6(2):32. <https://doi.org/10.3390/telecom6020032>
- Michelant L, Selmaoui B. **Impact of Radiofrequency Electromagnetic Fields on Cardiac Activity at Rest: A Systematic Review of Healthy Human Studies.** *Bioelectromagnetics*. 2025;46(5):e70014. <https://doi.org/10.1002/bem.70014>
- Priya K, Singh M, Haokip L, Sharma K, Giri S, Kumar A, Gill HS, Rustogi S, Rajeev M, Lahiri D, Nag M. **Effect of electromagnetic radiations from mobile towers on genetic damage and genetic polymorphism in humans: a review on India's perspective.** *Toxicology and Environmental Health Sciences*. 2025;eFIRST-2025-08. <https://doi.org/10.1007/s13530-025-00273-9>

- Seewooruttun C, Mai TC, Corona A, Delanaud S, de Seze R, Bach V, Desailoud R, Pelletier A. **Electromagnetic fields from mobile phones: A risk for maintaining energy homeostasis?** *Annales d'Endocrinologie*. 2025;86(3):101782. <https://doi.org/10.1016/j.ando.2025.101782>
- Simko M, Repacholi MH, Foster KR, Mattsson MO, Croft RJ, Scarfi MR, Vijayalaxmi. **Exposure to radiofrequency electromagnetic fields and IARC carcinogen assessment: Risk of Bias preliminary literature assessment for 10 key characteristics of human carcinogens.** *Mutation research. Reviews in mutation research*. 2025;796:108545. <https://doi.org/10.1016/j.mrrev.2025.108545>
- Tummala M, Bekal P, Kumar P, Puri S, Rawat S, Kumari A. **A systematic review on current and future prospects of 5G communications.** *Cogent Engineering*. 2025;12(1):2547635. <https://doi.org/10.1080/23311916.2025.2547635>
- Turgut A, Korunur Engiz B. **Exploring research trends in health effects of 5G antennas: a bibliometric analysis.** *Electromagnetic biology and medicine*. 2025;eFIRST-2025-08:1–20. <https://doi.org/10.1080/15368378.2025.2539147>
- Verbeek J, Zeeb H, van Deventer E, Ijaz S, Dore JF, Driessen S, Roth N, Whaley P. **Systematic reviews and meta-analyses for the WHO assessment of health effects of exposure to radiofrequency electromagnetic fields, an introduction.** *Environment International*. 2025;eFIRST 2025-08:109751. <https://doi.org/10.1016/j.envint.2025.109751>
- Virto LR, Saba P, Thielens A, Czerwinski M, Um PN. **Digital Sustainability Trade-Offs: Public Perceptions of Mobile Radiation and Green Roofs.** *Communications of the Association for Information Systems*. 2025;56:720–762. <https://doi.org/10.17705/1cais.05628>
- Weller SG, McCredden JE, Leach V, Chu C, Lam AK-y. **A scoping review and evidence map of radiofrequency field exposure and genotoxicity: assessing in vivo, in vitro, and epidemiological data.** *Frontiers in Public Health*. 2025;13:1613353. <https://doi.org/10.3389/fpubh.2025.1613353>

radiofrequency – theory/molecular mechanism (5)

- Grishkov VE, Uryupin SA. **Influence of photoexcited and thermal electrons and holes on generation of THz radiation in InAs in magnetic field.** *Applied Physics B*. 2025;131(7):133. <https://doi.org/10.1007/s00340-025-08497-w>
- Hao HT, Chen C, Ma YQ, Ding HM. **Impact of terahertz waves in altering C2AB binding to lipid bilayers: Insights from molecular dynamics simulations.** *Physical review E*. 2025;111(6-1):064411. <https://doi.org/10.1103/w85m-fbhp>
- Vargas-Rosales PA, Giangreco G, Caflisch A. **Disrupting Amyloid Filaments of Tau by Means of Electric Fields.** *Journal of physical chemistry. B*. 2025;129(36):9124–9137. <https://doi.org/10.1021/acs.jpccb.5c04393>
- Zhao X, Ding W, Wang H, Li Y, Liu C. **Destabilization of water molecules by terahertz electric fields affects sodium ion blockage in the Kv1.2 channel.** *Physical review E*. 2025;111(6-1):064401. <https://doi.org/10.1103/PhysRevE.111.064401>
- Zheng Q, Zhao N. **Probing a terahertz single photon in a neuron with solid-state defect centers.** *Optics letters*. 2025;50(17):5470–5473. <https://doi.org/10.1364/OL.568187>

Bitte beachten Sie, dass die Studien mithilfe fortgeschrittener maschineller Lerntechniken kategorisiert werden.

Please note that studies are categorised using advanced machine learning techniques.

Impressum

Bundesamt für Strahlenschutz
Postfach 10 01 49
38201 Salzgitter

www.bfs.de

Tel.: +49 30 18333-0
Fax: +49 30 18333-1885
E-Mail: spotlight@bfs.de

Bitte beziehen Sie sich beim Zitieren dieses Dokumentes immer auf folgende URN:
[urn:nbn:de:0221-2025093055458](https://nbn-resolving.org/urn:nbn:de:0221-2025093055458)

Spotlight - Literaturliste 2025/3