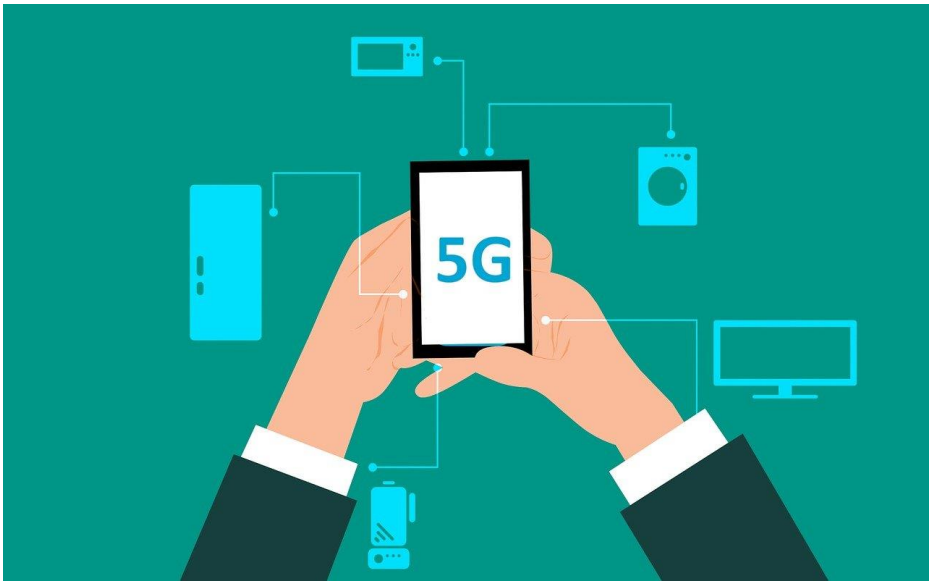
TECHNOLOGIE 5G

Bulletin de veille scientifique : Avril 2025



Objectifs : réaliser une veille scientifique sur la technologie 5G

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Généralités

Rapid Deployment of 5G Wireless Communication and Risk Assessment on Human Health: Quid Novi?

Selmaoui B, Jamal L, Michelant L. *Bioelectromagnetics*. 2025 May;46(4):e70005.

Lien vers l'article

Does personal relevance moderate communication effects? The example of risk communication about 5G-related electromagnetic fields.

Eggeling-Böcker M, Karabetsos E, Christopoulou M, Link SC, Abacioglu F, Boehmert C. *Open Res Eur*. 2025;5:13.

BACKGROUND: Technological advancements, such as the introduction of 5G, offer opportunities but also raise concerns. Although no evidence suggests negative effects of radiofrequency electromagnetic fields (RF-EMF) within defined exposure limits, authorities responsible for risk communication provide precautionary advice to help citizens reduce personal exposure. However, previous research indicates that precautionary information can increase risk perception and decrease trust. METHODS: This cross-sectional study investigated effects of precautionary information on risk perception and trust in the context of 5G, using large general population samples in Germany and Greece. For the first time, personal relevance was examined as a potential moderating factor, using a novel approach to assess practical and thematic relevance. Participants were first surveyed on their relevance of the topic, then provided with basic information about "RF-EMF and health", and, in the experimental group, with additional precautionary information. Different measures for risk perception and trust followed. We expected higher risk perception and lower trust for the experimental group, and assumed that at lower personal relevance, this effect would be stronger. RESULTS: Contrary to expectations, precautionary information increased just one risk perception measure and only in Germany. The anticipated moderating effect of personal relevance was not found, but relevance itself significantly predicted risk perception, with higher relevance correlating with higher risk perception. Exploratory findings revealed higher risk perception among females compared to males and in Greece compared to Germany. CONCLUSIONS: That there were only few effects of the precautionary information may be linked to the focus on actions to reduce personal exposure when using mobile devices. The results underline the importance of considering personal relevance and demographic factors in risk communication and highlight directions for future research.

Lien vers l'article

Impact of Regulation on TV White Space Implementation in Brazil: Laboratory and Field Analyses Using 5G-RANGE System.

Cunha MSB, Ferreira JS, Marins ARR, Lima RAB, Zorello G, Mendes LL. *Sensors (Basel)*. 2025 Apr 14;25(8).

This paper presents the results of field tests conducted in the project "Implementation of TV White Spaces (TVWS) for Internet Access in Brazil". This study evaluates the feasibility and regulatory implications of TVWS in rural and remote areas. TVWS systems are promising for sensor network applications, enabling efficient and long-range connectivity. The experiments assess the coexistence

of TVWS signals, applying, for example, the Remote Area Access Network System for the Fifth Generation (5G-RANGE) using the generalized frequency division multiplexing (GFDM) technique, with the Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) system. Laboratory tests determined the protection ratio (PR) between digital television (DTV) signals and interfering signals, with minimum PR values of -31.38 dB on channel n-1 and -33.24 dB on channel n+1 for 5G-RANGE using GFDM, highlighting its low out-of-band emission (OOBE). Field tests confirmed the laboratory results, with the worst recorded PR causing interference being -30.2 dB on channel n-1. The power restriction to 1 Wp limited coverage, allowing 96 Mbps in 24 MHz BW at 14.7 km from the base station. These results highlight that regulatory adjustments can be made to support TVWS deployment in Brazil.

Lien vers l'article

Performances et sécurité

Retraction Note: Investigation of the competitive nature of eMBB and mMTC 5G services in conditions of limited communication resource.

Kovtun V, Grochla K. *Sci Rep*. 2025 Apr 28;15(1):14789.

Lien vers l'article

Resource Allocation in 5G Cellular IoT Systems with Early Transmissions at the Random Access Phase.

Daraseliya A, Sopin E, Begishev V, Koucheryavy Y, Samouylov K. *Sensors (Basel)*. 2025 Apr 3;25(7).

While the market for massive machine type communications (mMTC) is evolving at an unprecedented pace, the standardization bodies, including 3GPP, are lagging behind with standardization of truly 5G-grade cellular Internet-of-Things (CIoT) systems. As an intermediate solution, an early data transmission mechanisms encapsulating the data into the preambles has been recently proposed for 4G/5G Narrowband IoT (NB-IoT) technology. This mechanism is also expected to become a part of future CIoT systems. The aim of this paper is to propose a model for CIoT systems with and without early transmission functionality and assess the optimal distribution of resources at the random access and data transmission phases. To this end, the developed model captures both phases explicitly as well as different traffic composition in downlink and uplink directions. Our numerical results demonstrate that the use of early transmission functionality allows one to drastically decrease the delay of uplink packets by up to 20-40%, even in presence of downlink traffic sharing the same set of resources. However, it also affects the optimal share of resources allocated for random access and data transmission phases. As a result, the optimal performance of 5G mMTC technologies with or without early transmission mode can only be attained if the dynamic resource allocation is implemented.

Lien vers l'article

Enhancing Security in 5G Edge Networks: Predicting Real-Time Zero Trust Attacks Using Machine Learning in SDN Environments.

Ashfaq F, Wasim M, Shah MA, Ahad A, Pires IM. *Sensors (Basel)*. 2025 Mar 19;25(6).

The Internet has been vulnerable to several attacks as it has expanded, including spoofing, viruses, malicious code attacks, and Distributed Denial of Service (DDoS). The three main types of attacks most frequently reported in the current period are viruses, DoS attacks, and DDoS attacks. Advanced DDoS and DoS attacks are too complex for traditional security solutions, such as intrusion detection systems and firewalls, to detect. The combination of machine learning methods with AI-based machine learning has led to the introduction of several novel attack detection systems. Due to their remarkable performance, machine learning models, in particular, have been essential in identifying DDoS attacks. However, there is a considerable gap in the work on real-time detection of such attacks. This study uses Mininet with the POX Controller to simulate an environment to detect DDoS attacks in real-time settings. The CICDDoS2019 dataset identifies and classifies such attacks in the simulated environment. In addition, a virtual software-defined network (SDN) is used to collect network information from the

surrounding area. When an attack occurs, the pre-trained models are used to analyze the traffic and predict the attack in real-time. The performance of the proposed methodology is evaluated based on two metrics: accuracy and detection time. The results reveal that the proposed model achieves an accuracy of 99% within 1 s of the detection time.

Lien vers l'article

Antennes

A self-octaplexing millimeter-wave antenna array for 5g fr2 spectrum.

Srivastava G, Kumar A, Mohan A, Kumar S, Ali T. *Sci Rep*. 2025 Mar 26;15(1):10386.

In this article, a quarter mode substrate integrated waveguide (QMSIW) self-octaplexing antenna array for fifth generation (5G) millimeter wave communications is presented. It consists of microstrip fed eight QMSIW antenna arrays to obtain the electromagnetic radiations at eight distinct frequency bands that lies in n257, n258, n259 and n260 of 5G spectrum for self-octaplexing operations. The designed self-octaplexing antenna array utilizes TE(110) mode of the QMSIW resonator. The designed antenna array radiates at 25.8, 27.5, 29.5, 31, 35.6, 36.8, 38.2 and 39.7 GHz with the corresponding gains of 9.7, 10.7, 10.9, 11.0, 11.4, 11.7, 11.9 and 12.2 dBi, respectively. High inter-port isolations (> 33 dB) are obtained over all the operating bands of the self-multiplexing antenna array.

Lien vers l'article

Enhanced isolation in aperture fed dielectric resonator MIMO antennas for 5G Sub 6 GHz applications.

Patel A, Upadhyaya T, Girjashankar PR, Swati MV, Kumar OP. *Sci Rep*. 2025 Mar 27;15(1):10653.

A quad-port dielectric resonator antenna (DRA) is proposed for sub-6 GHz 5G MIMO applications, featuring high isolation, dual-band operation, and enhanced efficiency. The antenna is designed using electromagnetic coupling with a triangular patch to excite the square dielectric resonators (DRs) at targeted resonance modes (TE(x)(111) and TE(x)(121)), achieving broadband and polarization diversity. The proposed structure exhibits self-isolation above 20 dB without requiring additional decoupling structures. The use of Alumina ($\varepsilon r = 9.9$, $\tan\delta = 0.0001$) ensures low loss, high efficiency (88.9% and 93.8%), and strong radiation performance, with peak gains of 9.12 dBi and 8.58 dBi at 3.72 GHz and 4.75 GHz, respectively. The full ground plane and optimized spatial placement further contribute to reduced mutual coupling and improved diversity performance, achieving an envelope correlation coefficient (ECC) of 0.042 and channel capacity loss (CCL) below 0.2 bits/s/Hz. The proposed antenna's measured results align closely with simulations, confirming its suitability for high-performance 5G MIMO communication systems.

Lien vers l'article

A shared aperture multiport antenna for rural wireless communication and safety monitoring using TVWS, ISM, and 5G mmWave bands.

Sufian MA, Lee SM, Choi D, Lee J, Sim D, Song M, et al. *Sci Rep*. 2025 Apr 18;15(1):13480.

To accommodate the antenna demand for rural communication and safety monitoring a shared aperture muti-port antenna sensor is presented for three different operating frequencies covering both Sub- 6 GHz and 5G millimeter-wave bands. The antenna sensor is designed on a single substrate, while different ports are connected to different radiating elements to achieve multiple frequency responses. The simulated and measured findings show that the presented antenna can cover TV-white-space (TVWS) frequency band, 5.8 GHz ISM band, and the 5G millimeter-wave frequency band. At the TVWS band, the antenna yields an omnidirectional radiation pattern with a peak gain of 3.14 dBi. While the antenna provides a unidirectional radiation pattern at the 5.8 GHz ISM and 5G millimeter-wave band with a peak gain of 6.76 dBi and 7.68 dBi, respectively. Moreover, all the antenna ports offer a radiation efficiency of more than 92%. Additionally, the 2-port MIMO configuration at the 5G millimeter-wave band shows excellent MIMO diversity performances by utilizing the proposed novel decoupling structure, which consists of metallic stub and cavity vias. Overall performance of the proposed antenna, especially the three operating frequency band including the TVWS band, makes it a viable solution for the sensing and communication in rural areas.

Lien vers l'article

Architecture réseau

Aucun article dans ce bulletin.

Efficacité énergétique

Energy-Aware Edge Infrastructure Traffic Management Using Programmable Data Planes in 5G and Beyond.

Brito JA, Moreno JI, Contreras LM. *Sensors (Basel)*. 2025 Apr 9;25(8).

Next-generation networks, particularly 5G and beyond, face rising energy demands that pose both economic and environmental challenges. In this work, we present a traffic management scheme leveraging programmable data planes and an SDN controller to achieve energy proportionality, matching network resource usage to fluctuating traffic loads. This approach integrates flow monitoring on programmable switches with a dynamic power manager in the controller, which selectively powers off inactive switches. We evaluate this scheme in an emulated edge environment across multiple urban traffic profiles. Our results show that disabling switches not handling traffic can significantly reduce energy consumption, even under relatively subtle load variations, while maintaining normal network operations and minimizing overhead on the control plane. We further include a projected savings analysis illustrating the potential benefits if the solution is deployed on hardware devices such as Tofino-based switches. Overall, these findings highlight how data plane-centric, energy-aware traffic management can make 5G-and-beyond edge infrastructures both sustainable and adaptable for future networking needs.

Lien vers l'article

Autres équipements

A dual layer wideband angular stable frequency selective surface for linear to circular and circular to linear polarization conversion for 5G applications.

Paramanik A, Venkata KC, Subramanian V. *Sci Rep*. 2025 Apr 8;15(1):12059.

This work proposes novel transmission type frequency selective surface (FSS) for converting linear to circular (LP to CP) and circular to linear (CP to LP) polarizations. The structure has dual metallic layers sandwiching a dielectric substrate (Rogers RT5880). Both top and bottom metallic layers have the same unit cell structure. This transmission-type polarization converter has a maximum polarization conversion efficiency (PCR) of 99.98% with a bandwidth of 23.8% at 27.3 GHz. The structure is also angularly stable upto 60(o). Though the structure is designed for the 5G band, it is possible to tune this structure to the frequency of our interest. The novelty of the proposed design lies in a low structural complexity, tunable frequency range, and very high angular stability. This low-loss, wideband, and high angularly stable polarization converter FSS type is an advantageous alternative to conventional CP sources and can be used for communication purposes.

Lien vers l'article

Dual band polarization insensitive metamaterial absorber for EMI shielding from GSM and 5G communication systems.

Moniruzzaman M, Larguech S, Mobarak M, Jizat NM, Alharbi SS, Islam MT, et al. *Sci Rep*. 2025 Apr 10;15(1):12292.

In this paper, a new metamaterial absorber (MMA) has been presented that shows dual-band absorption at 1.8 GHz and 3.5 GHz. The MMA cell has been designed on an FR4 substrate with the electrical dimension of $0.14\lambda(0) \times 0.14\lambda(0) \times 0.01\lambda(0)$, calculating wavelength, $\lambda(0)$ at 1.8 GHz. Maximum absorption of 98.7% and 99.7% are attained by a unique design of a resonating patch consisting of two modified circular rings that are finalized through numerical Simulation in CST microwave studio. The MMA exhibits high angular stability up to 60° for incident angle as well as polarization angle variations. The analogous equivalent circuit is modeled in advanced design system (ADS) software, providing the same reflection, transmission, and absorption characteristics of 3D Simulation in CST. The absorption mechanism is investigated through current and electromagnetic field analysis. The MMA exhibits negative permittivity within 1 GHz-1.8 GHz and 2.08 GHz - 3.49 GHz and negative permeability with other frequency ranges. The prototype of a 3×6 array of the MMA cell is developed, and measurement is accomplished. The measured result exhibits well match with the simulated result. Moreover, The MMA displays good shielding effectiveness of 40.12 dB and 36.81 dB at 1.8 GHz and 3.5 GHz, respectively. The quality factors of the MMA are 30 and 22.3, with half power bandwidth of 60 MHz and 157 MHz. This new and unique MMA can be incorporated with various electronic devices for microwave shielding from GSM 1.8 GHz and sub-6, 5G 3.5 GHz signals.

Lien vers l'article

Applications médicales et industrielles de la 5G

Applications industrielles

AI-driven 5G IoT e-nose for whiskey classification.

Segura-Garcia J, Fayos-Jordan R, Alselek M, Maicas S, Arevalillo-Herraez M, Navarro-Camba EA, et al. *Appl Intell (Dordr)*. 2025;55(7):686.

The main contribution is the design, implementation and validation of a complete AI-driven electronic nose architecture to perform the classification of whiskey and acetones. This classification is of paramount important in the distillery production line of whiskey in order to predict the quality of the final product. In this work, we investigate the application of an e-nose (based on arrays of single-walled carbon nanotubes) to the distinction of two different substances, such as whiskey and acetone (as a subproduct of the distillation process), and discrimination of three different types of the same substance, such as three types of whiskies. We investigated different strategies to classify the odor data and provided a suitable approach based on random forest with accuracy of 99% and with inference times under 1.8 seconds. In the case of clearly different substances, as subproducts of the whiskey distillation process, the procedure presented achieves a high accuracy in the classification process, with an accuracy around 96%.

Lien vers l'article

Applications médicales

A pilot study on the clinical feasibility of 5G remote robot-assisted gastrectomy.

Zhang M, Hu M, Yang J, Jing W, Guo J, Cai H, et al. *World J Surg Oncol*. 2025 Apr 2;23(1):117.

PURPOSE: Exploring the Clinical Safety and Feasibility of 5G Remote Surgery Robot-Assisted Gastrectomy. METHODS: A retrospective analysis was conducted on the clinical data of two patients who underwent 5G remote surgery robot-assisted gastrectomy at the General Surgery Clinical Center of Gansu Provincial Hospital from June to September 2024. One case involved a cross-provincial remote surgery between Gansu Provincial Hospital and Yangzhou University Affiliated Hospital, located over 1700 km apart, classified as the "long-distance patient." The other case involved a remote surgery within the province, between Gansu Provincial Hospital and the Gansu Provincial Hospital (Lanzhou New District Branch), located 70 km apart, classified as the "short-distance patient." General data, intraoperative conditions, network status, postoperative routine information, and postoperative follow-up data were recorded and analyzed for two patients. RESULT: Both patients successfully completed the surgery. The master-slave control duration for the long-distance surgery patient and the short-distance surgery patient were 259 min and 308 min, respectively; the total surgical durations were 285 min and 320 min, respectively. Neither patient experienced an intraoperative conversion to traditional surgery. The average total delay for the long-distance surgery patient was 99 ms, and for the short-distance surgery patient, it was 48 ms; the packet loss rates were 0.0188% and 0%, respectively, with no network jitter or interruptions observed. The long-distance surgery patient had a drainage tube retention time of 10 d, a postoperative hospital stay of 14 d. The short-distance surgery patient had a drainage tube retention time of 8 d, a postoperative hospital stay of 10 d. No

postoperative complications occurred in either patient. CONCLUSION: This study suggests that 5G remote surgery is feasible and safe, but larger-scale research is needed.

Lien vers l'article

5G remote robotic-assisted transcervical thyroidectomy: the first case report in the world.

Wu S, Wu N, Wang Y, Jing R, Wu Y, Yi S. *BMC Surg*. 2025 Apr 25;25(1):182.

BACKGROUND: The incidence of thyroid malignancies is increasing due to the development of detection techniques. The demand for aesthetics and precision has led surgeons to innovate in surgery, and with the development of 5G technology, telesurgery has become a reality. CASE PRESENTATION: We present the case of a 37-year-old woman with a physical examination that revealed a nodule of about 0.5*0.5 cm in size in the left lobe of the thyroid gland, with preoperative puncture pathology suggestive of papillary carcinoma. A 5G remote robotic thyroidectomy was performed from Shanghai to Shenzhen. CONCLUSIONS: We believe this paper reports the world's first 5G tele-robotic-assisted transthoracic breast approach thyroidectomy.

Lien vers l'article

Evaluation (Mesure des niveaux d'exposition)

Méthodes d'évaluation

Aucun article dans ce bulletin.

Evaluation population générale

Aucun article dans ce bulletin.

Risques professionnels

The microwave electromagnetic background as measured onboard the International Space Station.

Molodtsova DV, Strádi A, Artamonov AA, Kurdanov HA, Konstantinova NA, Ivanov OG, et al. *Life Sci Space Res (Amst)*. 2025 May;45:1-6.

This paper presents an attempt to experimentally evaluate the actual radiofrequency exposure levels onboard the International Space Station in terms of absorbed energy (power) density, which is essential for the confirmation of manned space flight safety. The measurements were made with the use of compact stand-alone electromagnetic dosimeters, capable for recording the absorbed energy (power) density in the frequency band 0.8-8.0 GHz once per minute. As a result of experimental data analysis for two representative locations at the MLM module of the ISS, it is possible to establish that the absorbed energy (power) densities can reach the following levels: 0.7 nW/cm(2) on average per day with maximal possible value of 119.8 nW/cm(2) in the Crew cabin; and 1.4 nW/cm(2) on average per day with maximal possible value of 207.8 nW/cm(2) at Central post. Though the maximal exposure levels recommended for the ISS electromagnetic hardware in the similar frequency band aren't exceeded so far, the existing recommendations for the ISS electromagnetic hardware with frequencies above 8.0 GHz makes us believe such equipment can pose an excessive radiofrequency exposure in some of the locations at ISS, so the further experimental electromagnetic measurements are still necessary in the extended frequency band.

Lien vers l'article

Effets biologiques et sur la santé

In silico

Aucun article dans ce bulletin.

In vitro

Aucun article dans ce bulletin.

Sur l'animal

Repeated Head Exposures to a 5G-3.5 GHz Signal Do Not Alter Behavior but Modify Intracortical Gene Expression in Adult Male Mice.

Lameth J, Royer J, Martin A, Marie C, Arnaud-Cormos D, Lévêque P, et al. *Int J Mol Sci*. 2025 Mar 10;26(6).

The fifth generation (5G) of mobile communications promotes human exposure to electromagnetic fields exploiting the 3.5 GHz frequency band. We analyzed behaviors, cognitive functions, and gene expression in mice submitted to asymmetrical head exposure to a 5G-modulated 3.5 GHz signal. The exposures were applied for 1 h daily, 5 days per week over a six-week period, at a specific absorption rate (SAR) averaging 0.19 W/kg over the brain. Locomotor activities in an open field, object location, and object recognition memories were assessed repeatedly after four weeks of exposure and did not reveal any significant effect on the locomotion/exploration, anxiety level, or memory processes. mRNA profiling was performed at the end of the exposure period in two symmetrical areas of the right and left cerebral cortex, in which the SAR values were 0.43 and 0.14 W/kg, respectively. We found significant changes in the expression of less than 1% of the expressed genes, with over-representations of genes related to glutamatergic synapses. The right cortical area differed from the left one by an over-representation of responsive genes encoded by the mitochondrial genome. Our data show that repeated head exposures to a 5G-3.5 GHz signal can trigger mild transcriptome alterations without changes in memory capacities or emotional state.

Lien vers l'article

5G Radiofrequency Exposure Reduces PRDM16 and C/EBP β mRNA Expression, Two Key Biomarkers for Brown Adipogenesis.

Seewooruttun C, Bouguila B, Corona A, Delanaud S, Bodin R, Bach V, et al. *Int J Mol Sci*. 2025 Mar 20;26(6).

The widespread use of wireless technologies has raised public health concerns about the biological effects of radiofrequency (RF) exposure. Children have a higher specific absorption rate (SAR) of

radiation energy compared to adults. Furthermore, brown adipose tissue (BAT) is more prevalent in infants and tends to decrease with age. Previous animal studies demonstrated a cold sensation in rats exposed to 900 MHz (second generation, 2G). UCP1-dependent thermogenesis and BAT hyperplasia are two fundamental adaptive mechanisms initiated in response to cold. This study investigated the impact of short-term exposure to 2G and fifth generation (5G) on key thermogenic and adipogenic markers related to these mechanisms while considering age and exposure duration. Juvenile and young adult Wistar rats were randomized into three subgroups: a 5G group (3.5 GHz), 2G group (900 MHz), and a control group (SHAM). They were exposed to their respective continuous-wave RF signals for 1 or 2 weeks at an intensity of 1.5 V/m, with two exposure sessions of 1 h per day. After the exposure period, a RT-qPCR was carried out to evaluate the genetic markers involved in BAT thermogenesis and adipogenesis. Two adipogenic biomarkers were affected; a fold change reduction of 49% and 32% was detected for PRDM16 ($p = 0.016$) and C/EBP β ($p = 0.0002$), respectively, after 5G exposure, regardless of age and exposure duration. No significant RF effect was found on UCP1-dependent thermogenesis at a transcriptional level. These findings suggest that exposure to a 5G radiofrequency may partially disrupt brown adipocyte differentiation and thermogenic function by downregulating PRDM16 and C/EBP β, possibly leading to higher cold sensitivity.

Lien vers l'article

Sur l'homme

Chicken or egg? Attribution hypothesis and nocebo hypothesis to explain somatization associated to perceived RF-EMF exposure.

Ariccio S, Traini E, Portengen L, Martens A, Slottje P, Vermeulen R, et al. *Front Public Health*. 2025;13:1561373.

INTRODUCTION: The aim of this study is to understand the temporal relationship between the somatization usually attributed to RF-EMFs, and to evaluate the attribution hypothesis and the nocebo hypothesis in this context. METHOD: In this longitudinal study, data from the Dutch Occupational and Environmental Health Cohort Study (AMIGO) was analyzed, consisting of a baseline questionnaire collected in 2011 (14,829 participants) and a follow-up questionnaire collected in 2015 (7,904 participants). Participants completed a questionnaire providing information on their health status, perceived environmental exposures, and demographics. Two sets of multiple regressions were conducted to evaluate the two hypotheses. RESULTS: Results show that the attribution hypothesis overall explained symptom reporting in association to perceived RF-EMF base station exposure and perceived electricity exposure more frequently than the nocebo hypothesis. DISCUSSION: This finding stands out from most of the existing literature, which primarily points to the nocebo effect as the main explanation for somatization in response to RF-EMF exposure. While this does not exclude, in absolute terms, the existence of a nocebo effect, potentially at other time scales, this finding has relevant consequences at the policy making level. The emerging relevance of the attribution hypothesis moves the focus on the discomfort of people with unexplained symptoms and their need to find a plausible explanation for their discomfort.

Lien vers l'article

Understanding Electromagnetic Hypersensitivity (EHS) From Mobile Phone Radiofrequency Radiation (RFR) Exposure: A Mixed-Method Study Protocol.

Razak N, Rahman AA, Minhat HS, Fauzi FA. *Bioelectromagnetics*. 2025 May;46(4):e70007.

More than 7 billion mobile phone users were recorded worldwide in 2022. Radiofrequency radiation (RFR) from mobile phones can produce radiobiological effects, which may lead to electromagnetic hypersensitivity (EHS) in humans. This study employs a mixed-method approach: the quantitative component identifies predictors of EHS from mobile phone RFR using the biopsychosocial model, whereas the qualitative component explores individual experiences that contribute to EHS. Quantitative analysis is conducted using the Statistical Package for the Social Sciences (SPSS) version 25.0 for descriptive and analytical statistics, whereas qualitative analysis is carried out with NVivo version 14 for thematic analysis. Findings from both analyses are compared and discussed to highlight similarities and differences, providing a richer, in-depth understanding of EHS resulting from mobile phone RFR exposure among undergraduate students. The study sample consists of 351 undergraduate students aged 18-25 from Universiti Putra Malaysia (UPM), conducted between April 2023 and December 2023. Approval was obtained from the Ethics Committee for Research Involving Human Subjects at UPM before the study. The quantitative component uses a proportionate simple random sampling method with a validated questionnaire, whereas the qualitative component utilizes purposive sampling through in-depth interviews. Enhancing understanding of EHS may contribute to new knowledge and raise awareness of its potential effects on the population. Bioelectromagnetics. 00:00-00, 2025. © 2025 Bioelectromagnetics Society.

Lien vers l'article

Impact of expectancy on fatigue by exposure to the fifth generation of mobile communication signals.

Yang L, Ding X, Zhang S, Wu T. *Electromagn Biol Med*. 2025 Apr 23:1-12.

There is a long-standing debate about the relationship between Radio Frequency Electromagnetic Field (RF-EMF) exposure and fatigue. Past studies primarily rely on self-report scales to assess fatigue, but these methods are often susceptible to personal biases. Notably, the role of psychological factors in the fatigue response induce by RF-EMF exposure remains unclear. Therefore, our study focuses on exploring the impact of 5 G signal exposure on human fatigue, particularly considering the influence of expectancy induced by psychological priming on the outcomes. In this study, we recruited 21 healthy subjects who were tested in three sessions. Each session included two 30-min exposures to either real or sham 5 G signals, with the order randomized. The experiment was conducted under varying informational conditions: subjects were provided with correct, false, or no information about the order of exposure. Additionally, subjects completed a fatigue scoring questionnaire and underwent Electroencephalogram (EEG) measurements during the experiment. The statistical comparison indicates that 5 G RF-EMF exposure at routine levels does not lead to changes in EEG power. The finding reveals that the report of fatigue can be altered by the conveyed information of being exposed by 5 G signals although there is no real exposure and no detectable electrophysiological indicator. Our findings suggest that it is necessary to prevent psychological priming in any kind or to take its possible consequence into consideration, to reveal this effect of RF-EMF exposure.

Lien vers l'article

Reproduction

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Dispositifs médicaux implantables

Aucun article dans ce bulletin.