Les plantes

# Plant Responses to High Frequency Electromagnetic Fields

**Alain Vian,[1] Eric Davies,[2] Michel Gendraud,[3] and Pierre Bonnet[4,5]**

[1]*Université d'Angers, Campus du Végétal, UMR 1345 IRHS, CS 60057, SFR 4207 QUASAV, 49071 Beaucouzé Cedex, France*
[2]*Department of Plant and Microbial Biology, North Carolina State University, P.O. Box 7612, Raleigh, NC 27695, USA*
[3]*Université Blaise Pascal, 24 avenue des Landais, 63177 Aubière Cedex, France*
[4]*Institut Pascal, Université Blaise Pascal, BP 10448, 63000 Clermont-Ferrand, France*
[5]*CNRS, UMR 6602, 63171 Aubière, France*

Correspondence should be addressed to Alain Vian; alain.vian@univ-angers.fr

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High frequency nonionizing electromagnetic fields (HF-EMF) that are increasingly present in the environment constitute a genuine environmental stimulus able to evoke specific responses in plants that share many similarities with those observed after a stressful treatment. Plants constitute an outstanding model to study such interactions since their architecture (high surface area to volume ratio) optimizes their interaction with the environment. In the present review, after identifying the main exposure devices (transverse and gigahertz electromagnetic cells, wave guide, and mode stirred reverberating chamber) and general physics laws that govern EMF interactions with plants, we illustrate some of the observed responses after exposure to HF-EMF at the cellular, molecular, and whole plant scale. Indeed, numerous metabolic activities (reactive oxygen species metabolism, $\alpha$- and $\beta$-amylase, Krebs cycle, pentose phosphate pathway, chlorophyll content, terpene emission, etc.) are modified, gene expression altered (calmodulin, calcium-dependent protein kinase, and proteinase inhibitor), and growth reduced (stem elongation and dry weight) after low power (i.e., nonthermal) HF-EMF exposure. These changes occur not only in the tissues directly exposed but also systemically in distant tissues. While the long-term impact of these metabolic changes remains largely unknown, we propose to consider nonionizing HF-EMF radiation as a noninjurious, genuine environmental factor that readily evokes changes in plant metabolism.

# Les animaux

Anses – Les Cahiers de la Recherche N° 9 - Santé, Environnement, Travail – mai 2017

## L'exposition aux radiofréquences considérée comme une astreinte

*Réponses physiologiques d'adaptation ou d'évitement du rat juvénile exposé aux ondes radiofréquences type antenne relais*

Véronique BACH et Amandine PELLETIER

Les hommes

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# Individual variation in temporal relationships between exposure to radiofrequency electromagnetic fields and non-specific physical symptoms: A new approach in studying 'electrosensitivity'

R.P. Bogers[a,*], A. van Gils[b], S.C.S. Clahsen[a], W. Vercruijsse[a,1], I. van Kamp[a], C. Baliatsas[a,2], J.G.M. Rosmalen[b], J.F.B. Bolte[a,c]

[a] National Institute for Public Health and the Environment (RIVM), PO Box 1, 3720 BA Bilthoven, the Netherlands
[b] University of Groningen, University Medical Center Groningen, Interdisciplinary Center Psychopathology and Emotion regulation (ICPE), PO Box 30.001, Hospital mail address CC72, 9700 RB Groningen, the Netherlands
[c] The Hague University of Applied Sciences, Faculty of Technology, Innovation, and Society, Smart Sensor Systems group, Rotterdamseweg 137, 2628 AL Delft, the Netherlands

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EMF
Personal exposure measurements

ABSTRACT

*Background:* Everyday exposure to radiofrequency electromagnetic fields (RF-EMF) emitted from wireless devices such as mobile phones and base stations, radio and television transmitters is ubiquitous. Some people attribute non-specific physical symptoms (NSPS) such as headache and fatigue to exposure to RF-EMF. Most previous laboratory studies or studies that analyzed populations at a group level did not find evidence of an association between RF-EMF exposure and NSPS.

*Objectives:* We explored the association between exposure to RF-EMF in daily life and the occurrence of NSPS in individual self-declared electrohypersensitive persons using body worn exposimeters and electronic diaries.

*Methods:* We selected seven individuals who attributed their NSPS to RF-EMF exposure. The level of and variability in personal RF-EMF exposure and NSPS were determined during a three-week period. Data were analyzed using time series analysis in which exposure as measured and recorded in the diary was correlated with NSPS.

*Results:* We found statistically significant correlations between perceived and actual exposure to wireless internet (WiFi - rate of change and number of peaks above threshold) and base stations for mobile telecommunications (GSM + UMTS downlink, rate of change) and NSPS scores in four of the seven participants. In two persons a higher EMF exposure was associated with higher symptom scores, and in two other persons it was associated with lower scores. Remarkably, we found no significant correlations between NSPS and time-weighted average power density, the most commonly used exposure metric.

*Conclusions:* RF-EMF exposure was associated either positively or negatively with NSPS in some but not all of the selected self-declared electrohypersensitive persons.

# ELECTROSENSIBILITÉ

en pratique clinique

THE

BOSTON MEDICAL AND SURGICAL JOURNAL.

NEW SERIES.] THURSDAY, APRIL 29, 1869. [VOL. III.—No. 13.

## Original Communications.

### NEURASTHENIA, OR NERVOUS EXHAUSTION.

By GEORGE BEARD, M.D., Lecturer on Nervous Diseases in the University of New York.

I AM to speak to-night of a *condition* of the system that is, perhaps, more frequently than any other, in our time at least, the cause and effect of disease.

I refer to *neurasthenia*, or exhaustion of the nervous system.

in the habit of employing the term *neurasthenia* to express the morbid state that is commonly indicated by the indefinite phrase nervous exhaustion.

This nomenclature would seem to be justified by philological analogy, by scientific convenience, and by actual necessity.

The derivation of the term *neurasthenia* is sufficiently obvious. It comes from the Greek νευρον, "a nerve," *a*, privative, and σθενος, "strength;" and, therefore, being literally interpreted signifies want of strength in the nerve.

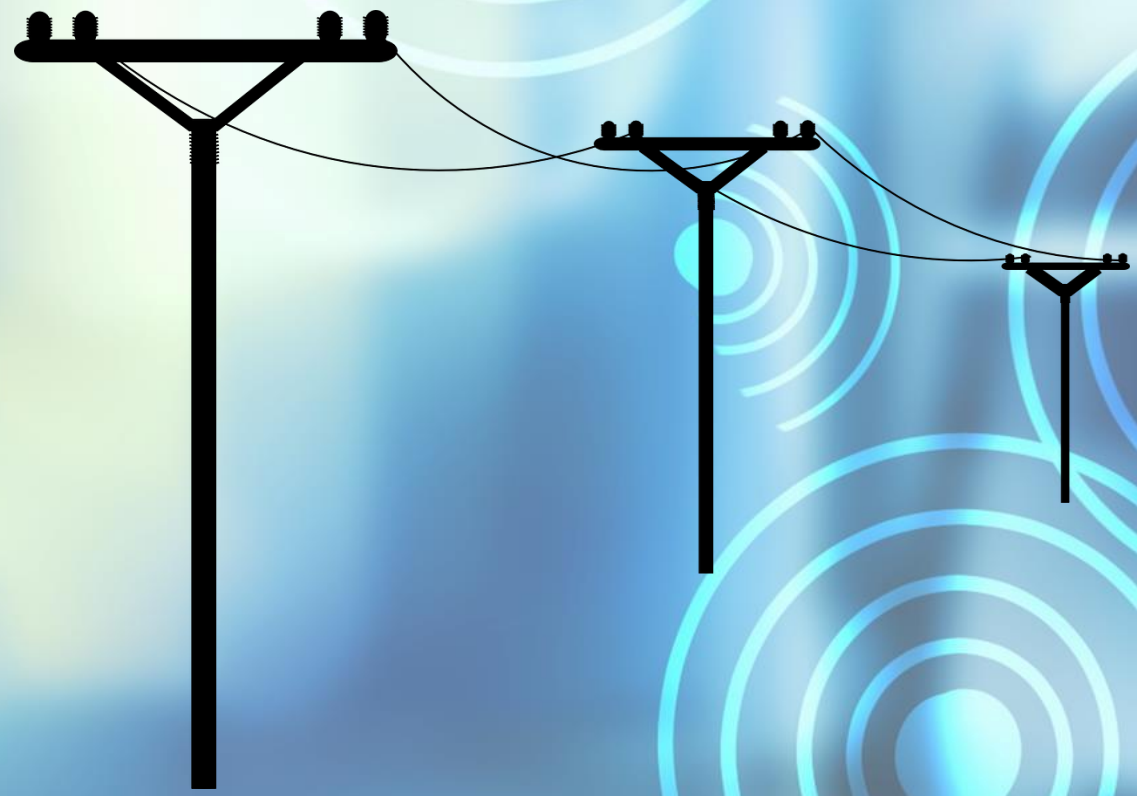
The character of this malady, if I be al-


Première description de la maladie par Georges Miller Beard un neurologue américain en 1869.

# ELECTROSENSIBILITÉ

en pratique clinique

- Pathologie des pays développés
- Pathologie ancienne dans les années 50 : « Maladie des ondes Radio »
- Prévalence 3%-5% de la population soit 3 à 5 millions de Français.
- 0,65% de la population inapte au travail soit 465 000 personnes (TOULOUSE)



L’électro-sensibilité en pratique clinique

# LE TERRAIN

- 2/3 de femme
- Pathologie avérée vers la Quarantaine
- La fratrie peut être touchée
- Les enfants d’un parent atteint peuvent être électrosensibles