

Preface

In 2008 a multidisciplinary panel of Latin American researchers in the areas of mobile communications, biology, medicine and health, was assembled with the aim of studying and producing an independent critical review of the recent literature on the possible biological and health effects of low-intensity, high-frequency electromagnetic fields, from the viewpoint of the region's scientists and experts. Special emphasis was to be placed on the results of studies conducted in Latin American countries. Examples of these electromagnetic fields, which are called radiofrequency (RF) fields, are those used for radio and TV communication, mobile voice and data communication and wireless data networks.

The study was called for and coordinated by the Edumed Institute for Medicine and Health, a non-profit research & development institution based in Campinas, State of São Paulo, Brazil, specifically as a project sponsored by its Research Group on Health Impacts of Wireless and Mobile Telecommunications.

Its main motivation, as explained in more detail in the Introduction section of this report, was to address the increasing preoccupation of the general public of Latin American countries with the possible detrimental effects of exposure of humans to non-ionizing electromagnetic fields generated mainly from base stations and cell phones, wireless data communication networks, and similar technologies. For this reason the review focused on RF fields.

The guiding principles that the authors of this Review have adopted were:

- Selecting papers which reported original research, or reviews of the literature, which were published in peer-reviewed journals or books according to the best practices and standards in this field of science;
- Reporting science-based evidence only and ignoring popular reports of the mass media;
- Using a neutral reporting tone and expressing conclusions based on the balance of scientific evidence.

The Latin America Science Review Expert Panel was composed by the following members:

- Prof. Renato Marcos Endrizzi Sabbatini, PhD (Biomedical scientist, Dept. Medical Genetics, School of Medical Sciences, State University of Campinas and President, Edumed Institute, Head of the Research Group on Health Impacts of Mobile Communications, Campinas, Brazil) – General Coordinator and Editor
- Prof. Gláucio Siqueira, PhD (Electrical Engineer, Dept. Electrical Engineering of the

- Pontifical Catholic University of Rio de Janeiro, Brazil)
- Prof. Victor Cruz Ornetta, EE, MSc (Electronic Engineer, National Institute for Research and Training in Telecommunications (INICTEL-UNI) , Faculty of Electronic Engineering of the University of San Marcos, Faculty of Engineering of the University Ricardo Palma, Lima, Peru)
- Prof. Ricardo Taborda, EE, PhD (Electrical Engineer, Researcher and Professor at the School of Electrical Engineering, University of Cordoba, Cordoba, Argentina)
- Ing. Jorge Skvarca (Electrical Engineer, Ministry of Health and Environment, Buenos Aires, Argentina)

In order to assure the highest quality possible for this review, the Expert Panel was advised by a group of noted international experts, who worked independently and who contributed with guiding principles and standards of quality, and who suggested many helpful modifications and improvements to the final report.

- Prof. Michael H. Repacholi, PhD (Biophysicist, Visiting Professor, University of Rome "La Sapienza", Rome Italy. Former Coordinator, Radiation and Environmental Health Unit, World Health Organization, Geneva, Switzerland. Responsible for WHO's radiation (ionizing and EMF) health programs. Past Chairman and Chairman Emeritus of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) – Chairman
- Prof. Paolo Vecchia, PhD (Physicist, Chairman of the International Commission on Non Ionizing Radiation Protection (ICNIRP), Research Director at the National Institute of Health (ISS) in Rome, Italy)
- Prof. Leeka Kheifets, PhD (Professor of Epidemiology at the University of California Los Angeles School of Public Health, USA).

In addition, the group evaluated the most recent research produced in the Latin American region on these topics by using an extensive search strategy and rigorous selection criteria regarding scientific quality and non-biased approaches to the investigation.

The present report contains the results of reviews and assessments of papers published up to February 2010.

The specific outputs of the initiative were to produce:

- A detailed technical report addressing six areas:
 - a critical review of the globally published scientific literature relating to the biological and health effects of exposure to low-level RF fields, including *in vitro* and *in vivo* experimental and observational scientific studies on effects at the molecular, cellular, organ and whole animal levels, as well as human laboratory and epidemiological studies;
 - the identification of Latin American research groups, active experts and researchers in the field, as well as the published literature record;
 - the relevant social issues of mobile telecommunications, including how to communicate with the general public in regard to possible health effects, safety issues, precautionary measures, etc.

- the status of non-ionizing electromagnetic protection standards and legislation in Latin American countries;
 - a roster of Latin American researchers and experts in RF fields, biology and health; and safety standards;
 - a list of recommendations of research topics that could and should be usefully conducted in Latin American countries
 - A public website in Portuguese, Spanish and English containing useful and practical information on health effects of RF fields, distance learning courses and other RF topics for the general public, teachers, legislators, etc.;
- One or more review papers, to be published in peer-review journals of relevance to the region, as well as in journals having an international reach.

A preparatory meeting of invited Latin American and international experts to establish the Report's aims and objectives, strategies and information sources, including the more detailed planning of contents and deliverables, preceded the work of the Expert Panel. Drs. Michael Repacholi and Paolo Vecchia delivered scientific review presentations at the meeting in August 2007, held in the city of São Paulo, Brazil. The review work was assigned to three working groups, coordinated by Expert Panel members:

1. Biological and health effects (effects on cells, tissues and whole animals);
Coordinated by Dr. Renato M.E. Sabbatini (Brazil)
2. Standards and policies (standards, regulations, protection programs, policies);
Coordinated by Prof. Victor Cruz (Peru), members Dr Gláucio Siqueira (Brazil) and Ing. Jorge Skvarca (Argentina)
3. Social research and public communication
Coordinated by Prof. Ricardo Taborda (Argentina) in collaboration with Dr Renato M.E. Sabbatini.

A second meeting was also held in São Paulo in May 2008, in collaboration with an International Symposium on High Frequency Electromagnetic Fields and Human Health (LASR 2008) held at the Polytechnic School of the University of São Paulo¹. Several of the members of the Expert Panel Working Groups presented preliminary reviews, conclusions and directions for further work. This conference was open to the public, and many government officials, physicians, engineers, representatives of the telecom industry, etc., were invited to participate and to join the discussion. Drs. Repacholi and Kheifets gave two pre-conference short courses on the subject.

A third and final meeting was held in October 2009 during the international meeting of the ICNIRP (EHE 2009) in Rio de Janeiro, Brazil, where a special session was devoted to Latin American perspectives on RF fields, and where Dr. Sabbatini presented the preliminary findings and conclusions of the biological and health effects chapters.

¹ <http://www.edumed.org.br/lasr2008/en/>

After passing through extensive reviews of the International Advisory Group, between November 2009 and January 2010, the final version of the document is presented here.

The Latin American Science Review Report is organized into the following main sections:

1. Introduction
2. Executive Summary
3. Review of the literature on biological and health effects
4. Social and communication issues
5. Safety and radiation protection standards in Latin America
6. References
7. Annexes

The review on biological and health effects is further subdivided into *in vitro* and *in vivo* studies, human experimental provocation studies, and epidemiological studies, and constitutes the main body of the Report. It was intended to be a general critical review of the literature, with the most up-to-date information as possible, but it is not a comprehensive, systematic review or a meta-analysis of published papers.

The contents and conclusions in this Report represent the consensus view of all members of the Expert Panel. The Expert Panel strove as much as possible to use language that can be easily read by everyone and explained the meaning of more obscure jargon and abbreviations.

The Report is not intended to be a tutorial or a general text on the subject since it does not include background material on the physics and radiobiology of RF fields, technical descriptions of radio communication devices and systems and scientific methods of investigation in the area. These materials can be found elsewhere. Due to the complexities of epidemiological research on humans, an annex with a short description on the types of such studies has been added.

The Latin American Expert Panel hopes that this Report will be useful for students, the general public, teachers, physicians and researchers, particularly those working in Latin America. In addition the Report should assist policy makers, legislators and government officials who often have to deal with demands for greater safety and need to make difficult decisions based on reliable information on the health aspects of RF fields used in telecommunications of all sorts. Mass media communicators are also invited to use the information provided herewith, in order to base their work on science-based evidence of the highest standard.

Finally, on behalf of the Expert Panel and of the Edumed Institute, I would like to gratefully

acknowledge the efforts and excellent contributions of all the people and institutions that collaborated and helped to make possible this Latin American Science Review.

Especially we would like to thank our international sponsors, the Mobile Manufacturers Forum (MMF) and GSM Association (GSMA), who provided some of the funding needed for the meetings, travel and preparation/translation of the report. Their support for the Latin American Science Review allowed for a truly independent assessment by the Expert Panel. All decisions and conclusions on the content of this Report were the sole responsibility of the Expert Panel and may not represent the views of the sponsors or their member companies.

In addition, all the members of the Expert Panel declare that they have no financial interests or binding commitments to private companies related to the subject of the Science Review.

Renato M.E. Sabbatini, PhD

Editor

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