

Rapport australien indépendant : 'Impacts des rayonnements des antennes-relais de téléphonie mobile' - 30/08/2008

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Titre original du rapport : **The Impacts of Radiofrequency Radiation from Mobile Phone Antennas**

EXTRAITS :

1. Introduction

Ce rapport met en évidence les effets de radiation des radiofréquences provenant des antennes relais sur la santé publique.

Les antennes relais émettent une radiation haute fréquence (radiofréquence) qui diffère d'une radiation naturelle par sa fréquence et les caractéristiques de son signal.

8. Conclusion

Les mesures standards australiennes ne protègent pas contre les niveaux de radiation continue, athermiques et à long terme auxquels sont exposés les riverains d'antennes relais. Des preuves existent, cependant, issues de source scientifique aussi bien que de témoignages de la vie quotidienne que l'exposition à de telles radiations induit des effets sanitaires négatifs sur la population riveraine des antennes relais. Certains individus se découvrent être plus sensibles que d'autres à ces radiations.

Rapport complet en pièce jointe, au format pdf.

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EMR Australia Pty Ltd

*Living more safely with
electromagnetic radiation*

Report

The Impacts of Radiofrequency Radiation from Mobile Phone Antennas

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1. Introduction

This report addresses the evidence for the impact of radiofrequency radiation from mobile phone antennas on people's health and well-being.

Mobile phone antennas emit high frequency (radiofrequency) radiation that differs from naturally-occurring radiation in frequency and characteristics of the signal.

2. The Australian Standard

The Australian standard that applies to mobile phone antennas is the Radiation Protection Standard "Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz". It was developed by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

The standard's public exposure limit is $468 \mu\text{W}/\text{cm}^2$ for 935 MHz and $900 \mu\text{W}/\text{cm}^2$ for 1800 MHz.

The following are some of the significant features of the Australian standard:

1. The standard protects against a limited range of short-term, thermal or heating effects of radiation and is not designed to protect against other effects.
2. There are no international standards that protect public health from long-term or nonthermal exposures such as occurs around mobile phone antennas.
3. The Australian government does not claim that this standard protects public health nor does it claim that it ensures "safety".
4. There are many peer-reviewed scientific studies showing adverse effects from levels of radiation too low to cause heating (athermal effects).

Typical exposure levels

Radiofrequency radiation emissions from antennas are generally very much lower than the levels permitted by Australian standards. According to ARPANSA, the maximum radiation levels measured at the base of towers is less than $2 \mu\text{W}/\text{cm}^2$ compared with $450 \mu\text{W}/\text{cm}^2$ allowed for a GSM antenna operating at 900 MHz.

3. Other standards and guidelines

Other standards and guidelines have been developed by some authorities and agencies. These recommend lower levels of exposure than those of Australian and international radiofrequency standards as a precautionary approach towards protecting public health.

1. The BioInitiative Report of 2007 was compiled by an expert group of international scientists and states, "What is clear is that the existing public safety standards limiting these radiation levels in nearly every country of the world look to be thousands of times too lenient. Changes are needed," It recommended: "A precautionary limit of $0.1 \mu\text{W}/\text{cm}^2$... should be adopted for outdoor, cumulative RF exposure."¹
2. Building Biology Evaluation Guidelines of the Building Biology Institute (Germany) provide the following guidelines for exposure:

¹ www.bioinitiative.org

- a. $<0.1 \mu\text{W}/\text{m}^2$ ($0.00001 \mu\text{W}/\text{cm}^2$) - no concern
 - b. $0.1 - 10 \mu\text{W}/\text{m}^2$ (0.00001 to $0.001 \mu\text{W}/\text{cm}^2$) - slight concern
 - c. $10 - 1000 \mu\text{W}/\text{m}^2$ (0.001 to $0.1 \mu\text{W}/\text{cm}^2$) - severe concern
 - d. $> 1000 \mu\text{W}/\text{m}^2$ ($> 0.1 \mu\text{W}/\text{cm}^2$) - extreme concern.²
3. The city of Salzburg, Austria has adopted a “precautionary strategy for the prevention of public health from electromagnetic fields”. It has implemented an exposure level for GSM of $0.1 \mu\text{W}/\text{cm}^2$.³
 4. Professor Dr Michael Kundi (University of Vienna, Institute of Environmental Health, Vienna) suggests reference levels of 0.1 to $1 \mu\text{W}/\text{cm}^2$.⁴
 5. Switzerland has guidelines that restrict public exposures at 900 MHz (GSM frequency) to $6 \mu\text{W}/\text{cm}^2$ and restrict public exposures at 1800 MHz to $10 \mu\text{W}/\text{cm}^2$.
 6. Christchurch Council in New Zealand has established a public exposure limit of $2 \mu\text{W}/\text{cm}^2$ and this has been recognised in law.⁵
 7. Italy has an exposure limit of 6 V/m for broadcast and mobile phone transmitters in buildings where people work for more than four hours per day.⁶
 8. Russia has public exposure limits of $8.4 \mu\text{W}/\text{cm}^2$ at 900 MHz and 1800 MHz.
 9. Canada’s Toronto City Council has introduced a Prudent Avoidance Policy for the siting of mobile phone antennas to “keep levels in areas where people normally spend time at least 100 times lower than Health Canada’s *Safety Code 6* limits when siting new telecommunications towers and antennas.”⁷
 10. In Australia various councils and the Federation of P&C Associations have introduced policies designed to protect the public from exposure to radiation from mobile phone antennas.

4. Scientific evidence of harmful effects of mobile phone tower radiation

Peer-reviewed scientific studies have identified adverse effects on populations living near mobile phone towers. A selection is provided:

Röösli, 2004

“sleep disorders (58%), headaches (41%), nervousness or distress (19%), fatigue (18%), and concentration difficulties were most common complaints. Complainants rated their symptoms most frequently to exposure to mobile phone base stations...”⁸

² www.baubiologie.de/downloads/english/richtwerte_2008_englisch.pdf

³ www.land-sbg.gv.at/celltower

⁴ www.land-sbg.gv.at/celltower

⁵ McIntyre vs Bell, South New Zealand Environment Court (A96/15NZPT, 1996)

⁶ Italian Official Journal n 257, 03.11.98.

⁷ www.toronto.ca/legdocs/mmis/2008/cc/bgrd/pg13.2att.pdf

⁸ Röösli, M et al, *Int J Hyg Environ Health*, 207(2):141-50, 2004.

Santini, 2002

“Comparisons of complaints frequencies ... in relation with distance from base station and sex, show significant ($p < 0.05$) increase as compared to people living >300 m or not exposed to base station, till 300m for tiredness, 200m for headache, sleep disturbance, discomfort, etc. 100m for irritability, depression, loss of memory, dizziness, libido decrease, etc. Women significantly more often than men ($p < 0.05$) complained of headache, nausea, loss of appetite, sleep disturbance, depression, discomfort and visual perturbations.”⁹

Bortkiewicz, 2004

“People living in the vicinity of base stations report various complaints mostly of the circulatory system, but also of sleep disturbances, irritability, depression, blurred vision, concentration difficulties, nausea, lack of appetite, headache and vertigo.”¹⁰

Navarro, 2003

People more exposed to radiation from mobile phone antennas in La Nora (operating at 1800 MHz) had more symptoms than those who were less-exposed. Exposure was associated with discomfort, irritability, appetite loss, fatigue, headache, difficulties concentrating and sleep disturbance.¹¹

Zwamborn, 2003

A study by the Dutch Technical Research Institute (TNO) found that volunteers exposed to a signal simulating exposure from a 3G (UTMS) antenna experienced adverse effects on well-being.¹²

Oberfeld, 2004

Spain, 2004: A follow-up study in Spain found that the most-exposed people in Murcia had a higher incidence of fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorders, depression, discomfort, difficulties concentrating, memory loss, visual disorders, dizziness and cardiovascular problems. The authors recommended a maximum exposure of $0.0001 \mu\text{W}/\text{cm}^2$.¹³

Oberfeld, 2005

Austrian researchers found that volunteers exposed to radiation typical of that experienced at 80 metres from a mobile phone tower experienced changes in the

⁹ Santini, R et al, *Pathol Biol (Paris)*, 50(6):369-73, 2002.

¹⁰ Bortkiewicz, A et al, *Med Pr*, 55(4):345-51, 2004.

¹¹ Navarro, E et al, *Electromagnetic Biology and Med* 22(2):161-9, 2003.

¹² Zwamborn, A et al, www.tno.nl/en/news/article_6265.html

¹³ Oberfeld, G et al, www.salzburg.gv.at/unweltmedizin.

electrical activity of their brains and feelings of unwellness. Subjects reported buzzing in the head, palpitations of the heart, unwellness, light-headedness, respiratory problems, nervousness, agitation, headache, tinnitus, heat, anxiety and depression.¹⁴

Hutter, 2006

This study looked at the effects of phone tower radiation among people living near ten GSM phone antennas in Vienna and Carinthia. It found that, in homes with highest exposures, people reported more unpleasant symptoms including:

- three times as many headaches;
- 2.3 times the incidence of tremor;
- 2.5 times the incidence of cold hands/feet and concentration problems;
- 2.4 times the incidence of appetite loss;
- twice as much exhaustion;
- twice as much fatigue.

“There was a significant relation of some symptoms to measured power density; this was highest for headaches. Perceptual speed increased, while accuracy decreased insignificantly with increasing exposure levels.”¹⁵

Abdel-Rassoul, 2007

“The prevalence of neuropsychiatric complaints as headache (23.5%), memory changes (28.2%), dizziness (18.8%), tremors (9.4%), depressive symptoms (21.7%), and sleep disturbance (23.5%) were significantly higher among exposed inhabitants [ie living near base stations]. ... the inhabitants opposite the station exhibited a lower performance in the problem solving test ... Inhabitants living nearby mobile phone base stations are at risk for developing neuropsychiatric problems and some changes in the performance of neurobehavioral functions either by facilitation or inhibition. So, revision of standard guidelines of public exposure to RFR from mobile phone base station antennas and using of NBTB for regular assessment and early detection of biological effects among inhabitants around the stations are recommended.”¹⁶

Oberfeld, 2008

The Austrian Department of Health found a higher risk of cancer among people living within 200 metres of a mobile phone base station and that cancer risk rose with increasing exposure, reaching 8.5 times the norm for people most exposed.¹⁷

¹⁴ Oberfeld, G et al, 3rd International Workshop on Biological Effects of Electromagnetic Fields, 4-8 October, 2004.

¹⁵ Hutter, H-P et al, *Occup Environ Med* 63 307-313, 2006.

¹⁶ Abdel-Rassoul, G et al, *Neurotoxicology* 28(2):434-40, 2007.

¹⁷ Correspondence from Dr Oberfeld.

5. Medical Practitioners

Medical practitioners have observed health problems and related problems in people living near mobile phone antennas.

Germany, 2002

In the Freiburger Appeal, a group of German doctors appeal to their government to reduce exposure to high frequency radiation on the basis of adverse effects they observed in their patients.

“we can see ... a clear temporal and spatial correlation between the appearance of disease and exposure to pulsed high-frequency microwave radiation (HFMR), such as installation of a mobile telephone sending station in the near vicinity...”

Among the symptoms they observed were headaches, migraines, chronic exhaustion, agitation, sleeplessness, tinnitus, susceptibility to infection, and nervous and connective tissue pains.¹⁸

Germany, 2004

A group of German doctors found an increased incidence of cancer in patients living near mobile phone towers. “The result of the study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance of up to 400 metres from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away, and that the patients fell ill on average 8 years earlier.”

The study also found that after five years of exposure, people had three times the risk of developing cancer of those living further from the transmitter.¹⁹

Germany, 2005

In 2005 German medical practitioners wrote an open letter to the Prime Minister, expressing concerns about symptoms they observed in patients living near antennas.

“Residents in the vicinity of masts have one or more of the following symptoms: sleep disturbance, tiredness, headache, restlessness, lethargy, irritability, inability to concentrate, forgetfulness, trouble finding words, depressive tendency, noises in the ears, impaired hearing, dizziness, nosebleeds, visual disturbances, frequent infections, sinusitis, joint and muscle pains, feeling deaf, palpitations, increased blood pressure, hormone disturbances, gaining weight, hair loss, nocturnal sweating, nausea.”

Other symptoms they observed included tinnitus, learning problems, swelling of lymph nodes, numbness, allergies, thyroid disease, frequent need to urinate, skin

¹⁸ www.emrnetwork.org/news/IGUMED

¹⁹ Presentation by Dr Horst Eger to Workshop on “Are RF-fields able to raise the risk of cancer?”, 15-17.11.2004.

complaints, diabetes, tumours and loss of appetite.

The doctors observed improvements in patients' health when they were away from or screened from the radiation of the antennas and called for a health survey of people living near antennas.”²⁰

Ireland 2005

The Irish Doctors' Environmental Association (IDEA) adopted a position on EMR which states that “a sub-group of the population are particularly sensitive to exposure to different types of electro-magnetic radiation.” In 2005 it called on the Irish Government to review information on health effects, to initiate research and to investigate forms of treatment. It recommended the establishment of a database of people suffering adverse symptoms and that treatment is provided by the State.

“An increasing number of people in Ireland are complaining of symptoms which, while they may vary in nature, intensity and duration, can be demonstrated to be clearly related to exposure to electro-magnetic radiation (EMR).”

“International studies on animals over the last 30 years have shown the potentially harmful effects of exposure to electro-magnetic radiation. In observational studies, animals have shown consistent distress when exposed to EMR. Experiments on tissue cultures and rats have shown an increase in malignancies when exposed to mobile telephone radiation.”

“Studies on mobile telephone users have shown significant levels of discomfort in certain individuals following extensive use or even, in some cases, following regular short-term use.”

“The current safe levels for exposure to microwave radiation were determined based solely on the thermal effects of this radiation. There is now a large body of evidence that clearly shows that this is not appropriate, as many of the effects of this type of radiation are not related to these thermal effects.”²¹

6. Statements by international scientists

International scientists have united to sign statements expressing the view that there is evidence of detrimental effects from radiofrequency radiation from communications technology at levels below international standards.

These statements, listed below, are included in full in the appendices.

1. The Vienna Resolution, 2008
2. The Bevento Resolution, 2006

²⁰ www.tetrawatch.net/links/links.php?id=stoiberlet

²¹ www.ideaireland.org/emr.htm

3. The Catania Resolution, 2002.

7. People's reactions to radiofrequency radiation

Many people report experiencing adverse effects from radiofrequency radiation from mobile phones and phone towers at levels far below those allowed by Australian and international standards. Generally this condition is referred to as Electromagnetic Hypersensitivity (EHS) and has been reported by thousands of people worldwide.

World Health Organisation (WHO)

The WHO recognises the existence of EHS and thus the fact that individuals react at levels of radiation below those in international standards.

“For some time a number of individuals have reported a variety of health problems that they relate to exposure to EMF. While some individuals report mild symptoms and react by avoiding the fields as best they can, others are so severely affected that they cease work and change their entire lifestyle. This reputed sensitivity to EMF has been generally termed “electromagnetic hypersensitivity” or EHS.

“This fact sheet describes what is known about the condition and provides information for helping people with such symptoms. Information provided is based on a WHO Workshop on Electrical Hypersensitivity (Prague, Czech Republic, 2004), an international conference on EMF and non-specific health symptoms (COST244bis, 1998), a European Commission report (Bergqvist and Vogel, 1997) and recent reviews of the literature.

“EHS is characterized by a variety of non-specific symptoms, which afflicted individuals attribute to exposure to EMF. The symptoms most commonly experienced include dermatological symptoms (redness, tingling, and burning sensations) as well as neurasthenic and vegetative symptoms (fatigue, tiredness, concentration difficulties, dizziness, nausea, heart palpitation, and digestive disturbances). The collection of symptoms is not part of any recognized syndrome.”²²

Sweden and EHS

In Sweden EHS is treated as a disability and the nation's peak support group, the FEB, are members of the national disability council. Sufferers are eligible for state-funded electrical sanitation of homes and workplaces.

Reports by people affected by radiofrequency radiation from mobile phone antennas

Individuals around the world have reported being negatively affected by radiation from mobile phone antennas. For example:

1. Couple's report when a new mobile phone base station (mast) was built within 300 m of their home: “The symptoms were ... burning pains in my teeth and cheeks, a great deal of facial color, concentration difficulties (trouble finding words), and after a few days of exposure my heart beat increased dramatically,

²² www.who.int/mediacentre/factsheets/fs296/en/index.html

with a resting pulse of about 110. ... Afterwards we could verify that the mast became operational on the same day my wife began to feel poorly at home.”²³

2. Husband writing about his Australian wife who is unable to live near mobile phone antennas and has left her home and family to move to the country: “She reacts severely to mobile phones in particular, as well as to transmission towers, underground fibre optic cables, high voltage power lines, and to more everyday items like telephones, TVs, radios, computers and fluorescent lights when they are turned on.”²⁴

Information about people experiencing problems from radiofrequency radiation can be found at websites of:

1. Mast Victims (www.mast-victims.org)
2. Mast Sanity (www.mastsanity.org)

8. Conclusion

Australian standards do not protect against the long-term, continuous and athermal levels of radiation people are exposed to from mobile phone antennas. There is evidence, both scientific and anecdotal, that this radiation exposure results in negative impacts on people. Some individuals are more sensitive to this radiation than others.

²³ Lind, R and J (Eds), “Black on White”, Sweden 2004.

²⁴ *EMR and Health*, 4(1), 2008.

Appendix 1

BIOLOGICAL EFFECTS OF MICROWAVES BELOW U.S. & CANADA'S REGULATORY LIMIT

(microW/cm²) Reported Biological Effects References

- 0.00000000000001 Altered genetic structure in *E. Coli* Belyaev 1996
- 0.0000000001 Threshold of human sensitivity Kositsky 2001
- 0.000000001 Altered EEG in human subjects Bise 1978
- 0.0000000027 Growth stimulation in *Vicius fabus* Brauer 1950
- 0.00000001 Effects on immune system in mice Bundyuk 1994
- 0.00000002 Stimulation of ovulation in chickens Kondra 1970
- 0.000005 Effect on cell growth in yeast Grundler 1992
- 0.00001 Conditioned "avoidance" reflex in rats Kositsky 2001
- 0.000027 Premature aging of pine needles Selga 1996

0.001 100 Yards / metres from Cell Phone

- 0.002 Sleep disorders, abnormal blood pressure, nervousness, weakness, fatigue,
- limb and joint pain, digestive problems, fewer schoolchildren promoted Altpeter 1995, 1997
- 0.0027 Growth inhibition in *Vicius fabus* Brauer 1950
- 0.0027 to 0.065 Smaller tree growth rings Balodis 1996

0.007 50 Feet from a Cordless Phone

- 0.01 Human sensation Kolbun 1987

0.016 1 Mile (1.6Km) from a Cellular Tower

- 0.06 Altered EEG, disturbed carbohydrate metabolism, enlarged adrenals, altered
- adrenal hormone levels, structural changes in liver, spleen, testes, and brain
- in white rats and rabbits Dumanskij 1974
- 0.06 Slowing of the heart, change in EEG in rabbits Serkyuk, reported in McRee 1980

0.05 10 Feet /3 meters from a Wireless Computer

- 0.1 Increase in melatonin in cows Stark 1997
- 0.1 to 1.8 Decreased life span, impaired reproduction, structural and developmental
- abnormalities in duckweed plants Magone 1996
- 0.13 Decreased cell growth (human epithelial amnion cells) Kwee 1997
- 0.168 Irreversible sterility in mice Magras 1997
- 0.2 to 8.0 Childhood leukemia near transmitters Hocking 1996
- 0.3 Impaired motor function, reaction time, memory and attention of school children, and altered sex ratio of children (fewer boys) Kolodynski 1996
- 0.6 Change in calcium ion efflux from brain tissue Dutta 1986
- 0.6 Cardiac arrhythmias and sometimes cardiac arrest (frogs) Frey 1968
- 0–4 Altered white blood cell activity in schoolchildren Chiang 1989
- 1.0 Headache, dizziness, irritability, fatigue, weakness, insomnia, chest pain, difficulty breathing, indigestion (humans—occupational exposure) Simonenko 1998
- 1.0 Stimulation of white cells in guinea pigs Shandala 1978
- 2.5 Breakdown of blood-brain barrier (used a digital cell phone to radiate) Salford 1997

- 5.0 Leukemia, skin melanoma and bladder cancer near TV and FM transmitter Dolk 1997
- 2.0 (lower “Microwave hearing” - clicking, buzzing, chirping, hissing, or high-pitched threshold note tones known) Frey 1963, 1969, 1971, 1973, 1988,
- Justeson 1979, Olsen 1980, Wieske 1963,
- Lin 1978
- 5.0 Biochemical and histological changes in liver, heart, kidney, and brain tissue Belokrinitskiy 1982
- 10.0 Damaged mitochondria, nucleus of cells in hippocampus of brain Belokrinitskiy 1982a
- 10.0 Impaired memory and visual reaction time in people living near transmitters Chiang 1989
- 10.0 Decreased size of litter, increased number of stillborns in mice Il’Chevich (reported in McRee 1980)
- 10.0 Redistribution of metals in the lungs, brain, heart, liver, kidney, muscles, spleen, bones, skin, blood Shutenko 1981
- 1,000.0 United States *FCC Exposure Limit*, *Safety Code 6* Canada limit

Meg Sears, *Medical Perspective on Environmental Sensitivities*, Canadian Human Rights Commission, 2007.

Appendix 2 Venice Resolution, 2008

Initiated by the International Commission for Electromagnetic Safety, June 6, 2008.

As stated in the Benevento Resolution of September 2006, we remain concerned about the effects of human exposure to electromagnetic fields on health. At the Venice Workshop, entitled, “Foundations of bioelectromagnetics: towards a new rationale for risk assessment and management,” we discussed electro-hypersensitivity, blood brain barrier changes, learning and behavioral effects, changes in anti-oxidant enzyme activities, DNA damage, biochemical mechanisms of interaction, biological damage and, experimental approaches to validate these effects. As an outcome, we are compelled to confirm the existence of non-thermal effects of electromagnetic fields on living matter, which seem to occur at every level of investigation from molecular to epidemiological.

An urgent task before international researchers is to discover the detailed mechanisms of non-thermal interactions between electromagnetic fields and living matter. A collateral consequence will be the design of new general public and occupational protection standards. We, who are at the forefront of this research, encourage an ethical approach in setting of exposure standards which protect the health of all, including those who are more vulnerable. We recognize the need for research to reveal the critical exposure parameters of effect and risk from exposure to electromagnetic fields.

The non-ionizing radiation protection standards recommended by international standards organizations, and supported by the World Health Organization, are inadequate. Existing guidelines are based on results from acute exposure studies and only thermal effects are considered. A world wide application of the Precautionary Principle is required. In addition, new standards should be developed to take various physiological conditions into consideration, e.g., pregnancy, newborns, children, and elderly people.

We take exception to the claim of the wireless communication industry that there is no credible scientific evidence to conclude there a risk. Recent epidemiological evidence is stronger than before, which is a further reason to justify precautions be taken to lower exposure standards in accordance with the Precautionary Principle.

We recognize the growing public health problem known as electrohypersensitivity; that this adverse health condition can be quite disabling; and, that this condition requires further urgent investigation and recognition.

We strongly advise limited use of cell phones, and other similar devices, by young children and teenagers, and we call upon governments to apply the Precautionary Principle as an interim measure while more biologically relevant standards are developed to protect against, not only the absorption of electromagnetic energy by the head, but also adverse effects of the signals on biochemistry, physiology and electrical biorhythms.

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Disclaimer statement: The signatories to these resolutions, have signed as individuals, giving their professional affiliations, but this does not necessarily mean that this represents the views of their employers or the professional organizations they are affiliated with.²⁵

²⁵ www.icems.eu/resolution.htm

Appendix 3 The Bevento Resolution, 2006

The International Commission for Electromagnetic Safety (ICEMS) held an international conference entitled *The Precautionary EMF Approach: Rationale, Legislation and Implementation.*, hosted by the City of Benevento, Italy, on February 22, 23 & 24, 2006. The meeting was dedicated to W. Ross Adey, M.D. (1922-2004). The scientists at the conference endorsed and extended the 2002 Catania Resolution and resolved that:

1. More evidence has accumulated suggesting that there are adverse health effects from occupational and public exposures to electric, magnetic and electromagnetic fields, or EMF¹, at current exposure levels. What is needed, but not yet realized, is a comprehensive, independent and transparent examination of the evidence pointing to this emerging, potential public health issue.
2. Resources for such an assessment are grossly inadequate despite the explosive growth of technologies for wireless communications as well as the huge ongoing investment in power transmission.
3. There is evidence that present sources of funding bias the analysis and interpretation of research findings towards rejection of evidence of possible public health risks.
4. Arguments that weak (low intensity) EMF cannot affect biological systems do not represent the current spectrum of scientific opinion.
5. Based on our review of the science, biological effects can occur from exposures to both extremely low frequency fields (ELF EMF) and radiation frequency fields (RF EMF). Epidemiological and *in vivo* as well as *in vitro* experimental evidence demonstrates that exposure to some ELF EMF can increase cancer risk in children and induce other health problems in both children and adults. Further, there is accumulating epidemiological evidence indicating an increased brain tumor risk from long term use of mobile phones, the first RF EMF that has started to be comprehensively studied. Epidemiological and laboratory studies that show increased risks for cancers and other diseases from occupational exposures to EMF cannot be ignored. Laboratory studies on cancers and other diseases have reported that hypersensitivity to EMF may be due in part to a genetic predisposition.
6. We encourage governments to adopt a framework of guidelines for public and occupational EMF exposure that reflect the Precautionary Principle² -- as some nations have already done. Precautionary strategies should be based on design and performance standards and may not necessarily define numerical thresholds because such thresholds may erroneously be interpreted as levels below which no adverse effect can occur. These strategies should include:
 - 6.1. Promote alternatives to wireless communication systems, e.g., use of fiber optics and coaxial cables; design cellular phones that meet safer performance specifications, including radiating away from the head; preserve existing land line phone networks; place power lines underground in the vicinity of populated areas, only siting them in residential neighborhoods as a last resort;
 - 6.2. Inform the population of the potential risks of cell phone and cordless phone use. Advise consumers to limit wireless calls and use a land line for long

conversations.

6.3. Limit cell phone and cordless phone use by young children and teenagers to the lowest possible level and urgently ban telecom companies from marketing to them.

6.4. Require manufacturers to supply hands-free kits (via speaker phones or ear phones), with each cell phone and cordless phone.

6.5. Protect workers from EMF generating equipment, through access restrictions and EMF shielding of both individuals and physical structures.

6.6. Plan communications antenna and tower locations to minimize human exposure. Register mobile phone base stations with local planning agencies and use computer mapping technology to inform the public on possible exposures. Proposals for city-wide wireless access systems (e.g. Wi-Fi, WIMAX, broadband over cable or power-line or equivalent technologies) should require public review of potential EMF exposure and, if installed, municipalities should ensure this information is available to all and updated on a timely basis.

6.7. Designate wireless-free zones in cities, in public buildings (schools, hospitals, residential areas) and, on public transit, to permit access by persons who are hypersensitive to EMF.

7. ICEMS³ is willing to assist authorities in the development of an EMF research agenda. ICEMS encourages the development of clinical and epidemiological protocols for investigations of geographical clusters of persons with reported allergic reactions and other diseases or sensitivities to EMF, and document the effectiveness of preventive interventions. ICEMS encourages scientific collaboration and reviews of research findings.

We, the undersigned scientists, agree to assist in the promotion of EMF research and the development of strategies to protect public health through the wise application of the precautionary principle.

1. EMF, in this resolution, refers to zero to 300 GHz.
2. The Precautionary Principle states when there are indications of possible adverse effects, though they remain uncertain, the risks from doing nothing may be far greater than the risks of taking action to control these exposures. The Precautionary Principle shifts the burden of proof from those suspecting a risk to those who discount it.
3. International Commission For Electromagnetic Safety. For information, link to www.icoms.eu.

Signed:

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²⁶ www.icems.eu/docs/BeneventoResolution.pdf

Appendix 4 CATANIA RESOLUTION, 2002

September 2002

The Scientists at the International Conference State of the Research on Electromagnetic Fields. Scientific and Legal Issues., organized by ISPEL*, the University of Vienna and the City of Catania, held in Catania (Italy) on September 13th. 14th, 2002, agree to the following:

1. Epidemiological and *in vivo* and *in vitro* experimental evidence demonstrates the existence of electromagnetic field (EMF) induced effects, some of which can be adverse to health.
2. We take exception to arguments suggesting that weak (low intensity) EMF cannot interact with tissue.
3. There are plausible mechanistic explanations for EMF-induced effects which occur below present ICNIRP and IEEE guidelines and exposure recommendations by the EU.
4. The weight of evidence calls for preventive strategies based on the precautionary principle. At times the precautionary principle may involve prudent avoidance and prudent use.
5. We are aware that there are gaps in knowledge on biological and physical effects, and health risks related to EMF, which require additional independent research.
6. The undersigned scientists agree to establish an international scientific commission to promote research for the protection of public health from EMF and to develop the scientific basis and strategies for assessment, prevention, management and communication of risk, based on the precautionary principle.

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²⁷ www.emrpolicy.org/regulation/international/docs/catania_resolution.pdf