ITU/UNESCO Forum on
Human Exposure to Electromagnetic Fields (EMFs)
in Latin America

Montevideo, Uruguay, 13 March 2014

RF and Health: A WHO Perspective

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World Health Organization

OUTLINE

- Introduction
- Assessing the health risk
- Managing the potential risk
- Conclusions

World Health Organization

- **Function**: act as the UN directing and coordinating authority on international health work
- **Objective**: "the attainment by all peoples of the highest possible level of health"
- **Definition**: "HEALTH is a state of COMPLETE physical, mental and social well-being and not merely the ABSENCE of disease or infirmity" (*Constitution, 1948*)

World Health Organization

PEOPLE

Last but not least, WHO is people. Over 8000 public health experts including doctors, epidemiologists, scientists, managers, administrators and other professionals from all over the world work for WHO in 147 country offices, six regional offices and at the headquarters in Geneva, Switzerland.

When diplomats met in San Francisco to form the United Nations in 1945, one of the things they discussed was setting up a global health organization. WHO's Constitution came into force on 7 April 1948 – a date we now celebrate every year as World Health Day.

Delegates from 53 of WHO's 55 original member states came to the first World Health Assembly in June 1948. They decided that WHO's top priorities would be malaria, women's and children's health, tuberculosis, venereal disease, nutrition and environmental sanitation – many of which we are still working on today. WHO's work has since grown to also cover health problems that were not even known in 1948, including relatively new diseases such as HIV/AIDS.

1948

International Classification of Disease

WHO took over the responsibility for the International Classification of Disease (ICD), which dates back to the 1850s and was first known as the International List of Causes of Death. The ICD is used to classify diseases and other health problems and has become the international standard used for clinical and epidemiological purposes.

1952–1964

Global yaws control programme

One of the first diseases to claim WHO's attention was yaws, a crippling and disfiguring disease that afflicted some 50 million people in 1950. The global yaws control programme, fully operational between 1952-1964, used long-acting penicillin to treat yaws with one single injection. By 1965, the control programme had examined 300 million people in 46 countries and reduced global disease prevalence by more than 95%.

1952 Dr Jonas Salk (US) develops the first successful polio vaccine.

1967 South African surgeon Christiaan Barnard conducts the first heart transplant.

1974 The World Health Assembly adopts a resolution to create the Expanded Programme on Immunization to bring basic vaccines to all the world's children.

1977 The first Essential Medicines List appeared in 1977, two years after the World Health Assembly introduced the concepts of "essential drugs" and "national drug policy". 156 countries today have a national list of essential medicines.

1974

Onchocerciasis control programmme

WHO worked for 30 years to eliminate onchocerciasis – or river blindness – from West Africa. 600 000 cases of blindness have been prevented and 18 million children spared from the disease. Thousands of farmers have been able to reclaim 25 million hectares of fertile river land that had been abandoned because of the risk of infection.

Mr Ali Maalin (left), from Somalia, was the last person known to be infected with smallpox. Here he stands with the doctor who treated him more than 25 years ago. Ali has since worked on polio eradication campaigns.

1979

Eradication of smallpox

The eradication of smallpox – a disease which had maimed and killed millions – in the late 1970s is one of WHO's proudest achievements. The campaign to eradicate the deadly disease throughout the world was coordinated by WHO between 1967 and 1979. It was the first and so far the only time that a major infectious disease has been eradicated.

1983 Institut Pasteur (France) identifies HIV.

2003

WHO Framework Convention on Tobacco Control

21 May 2003 was a historic day for global public health. After nearly four years of intense negotiations, the World Health Assembly unanimously adopted WHO's first global public health treaty. The treaty is designed to reduce tobacco-related deaths and disease around the world.

2004 Adoption of the Global Strategy on Diet, Physical Activity and Health.

1978 The International Conference on Primary Health Care, in Alma-Ata, Kazakhstan sets the historic goal of "Health for All" – to which WHO continues to aspire.

1988 Global Polio Eradication Initiative established

Since its launch in 1988, the Global Polio Eradication Initiative has reduced the number of cases of polio by more than 99% – from more than 350 000 per year to 1956 in 2006. Spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention and UNICEF, it has immunized more than two billion children thanks to the mobilization of more than 20 million volunteers and health workers. As a result, five million children are today walking, who would otherwise have been paralysed, and more than 1.5 million childhood deaths have been averted.

THE GOAL IS TO ERADICATE POLIO WORLDWIDE SO THAT NO CHILD WILL EVER AGAIN BE PARALYZED BY THIS DISEASE.

2003 Severe Acute Respiratory Syndrome (SARS) first recognized and then controlled.

2005 World Health Assembly revises the International Health Regulations.

WHO Department of Public Health, Social and Environmental Health

- Water sanitation and health
- Climate change
- Air pollution (indoor and outdoor)
- e-waste
- Energy and health
- Housing and health
- Radiation (electromagnetic fields, ultraviolet)
- …

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The Present EMF Context

- Increasing EMF human exposure due to electricity demand, medical technologies and wireless devices
- Increasing concern from the public

Applications using radiofrequency fields

(100 kHz – 300 GHz)

Telecommunications

Residential sources

Commercial

Security scanners

Emerging technologies

Broadcasting

World Health Organization

Applications using radiofrequency fields

Smart Meters

- Smart meters are increasingly being installed in homes and businesses to collect/report on electrical, water and natural gas consumption
- Allows remote real-time monitoring using two-way (radio) communication to relay information to the utility companies and to the consumers to help manage their energy use
- Increased public resistance due to concerns about health, privacy and cost to consumers

World Health Organization

Daily Mail
24 October 2002
Page 43

Mobiles 'boost cancer'

Radiation may make tumours grow faster

use are still unclear.

The biggest British study, led by Sir William Stewart two years ago, could find no evidence of a risk to health. But Sir William still recommended a precautionary approach, particularly in children.

The World Health Organisation has called for more research and has urged people to limit mobile use.

Now Italian scientists believe they could be closer to the truth.

Dr Fiorenzo Marinelli, of the National Research Council in

Cancer develops when control signals in a normal cell go wrong and an abnormal cell results. Instead of destroying itself the mutant cell keeps on dividing and forms a lump or tumour.

The results of the Italian study support the belief of some scientists who say radiation can damage DNA and destroy the cell repair system – making tumours more deadly.

Dr Peter de Pomerai of the University of Nottingham, who studied effects on the body car-

Stop Smart Meters!

Fighting for health, privacy, and safety

Home | About | Donate | FAQ | Why Stop Smart Meters? | Actions You Can Take | Direct Action | The Science | Protest "Opt Out" Fees | Defend Your Analog Meter | Sample Letter to Utility | SSM Bulletins | Press Releases | Local Contacts | Links | Order/ Download Flyers

The Present Scientific Knowledge

Large and increasingly sophisticated database

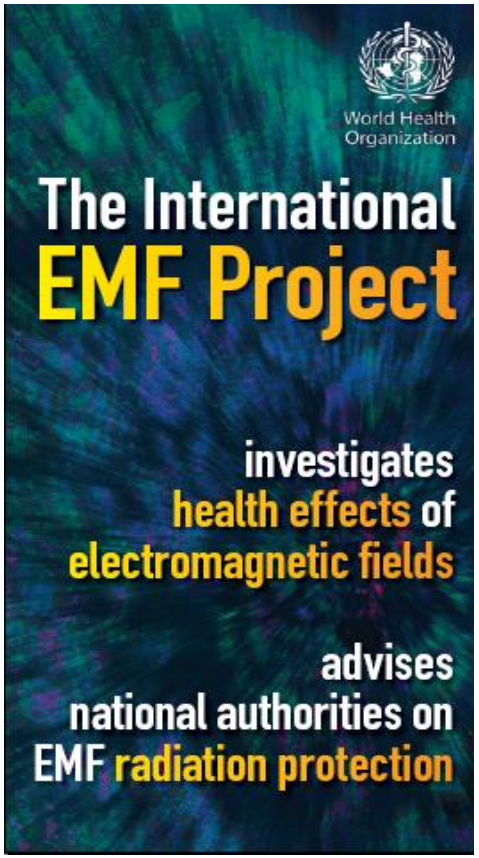
Known mechanisms

Health effects not established below international guidelines

Scientific uncertainty

WHO International EMF Project

- Established in 1996
- Coordinated by WHO HQ
- A multinational, multidisciplinary effort to create and disseminate information on human health risk from EMF



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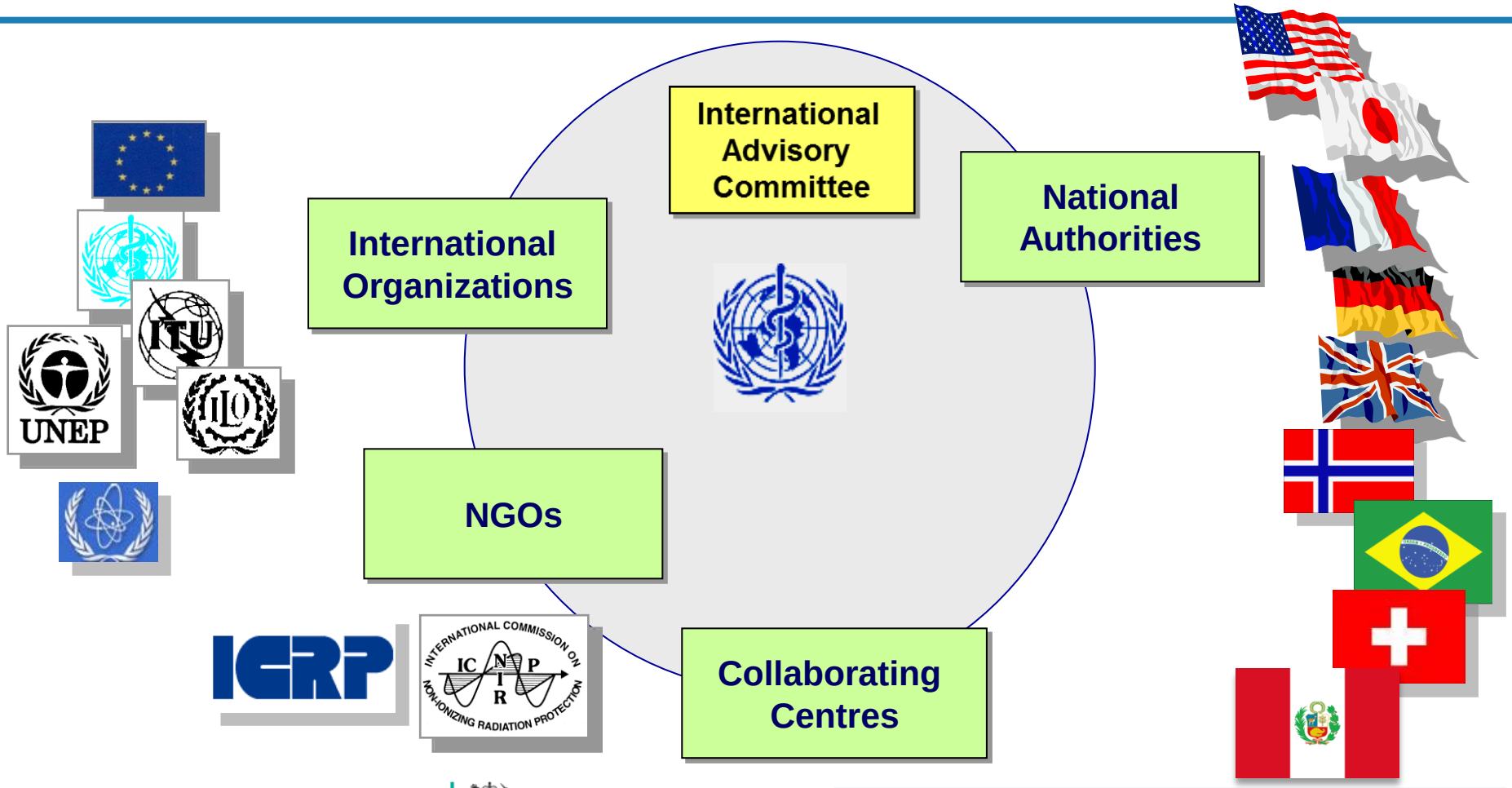
WHO Partners in Radiation



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mHealth
an ITU/WHO initiative

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tatistics | Media centre | Publications | Countries | Programmes and projects

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Media centre

ITU and WHO launch mHealth initiative to combat noncommunicable diseases

Plan to save lives and reduce costs agreed at ITU Telecom World 2012

Joint ITU/WHO news release

17 OCTOBER 2012 | DUBAI, UNITED ARAB EMIRATES - The International Telecommunication Union (ITU) and WHO today launched a new partnership called the 'mHealth' Initiative to use mobile technology, in particular text messaging and apps, to help combat noncommunicable diseases (NCDs) such as diabetes, cancer, cardiovascular diseases and chronic respiratory diseases.

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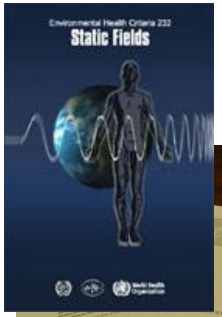
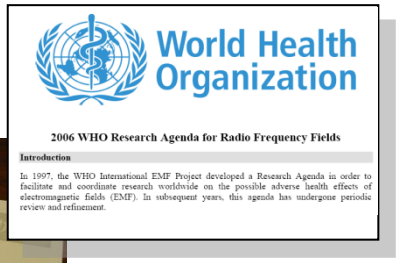
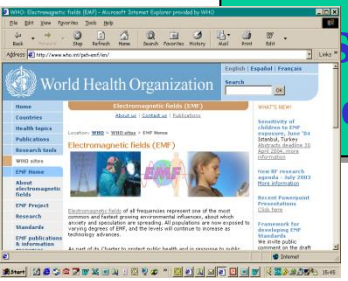
Do EMFs pose a heath risk?

Risk Assessment
The Evidence

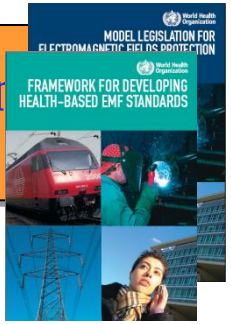






sk Perception
e Public Concern

Risk Managemer
The Policies



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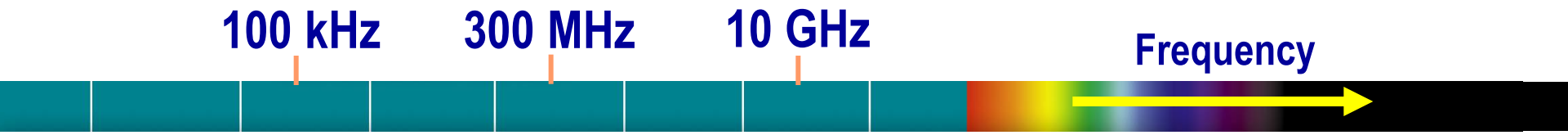
OUTLINE

- Introduction
- **Assessing the health risk**

What do we know?



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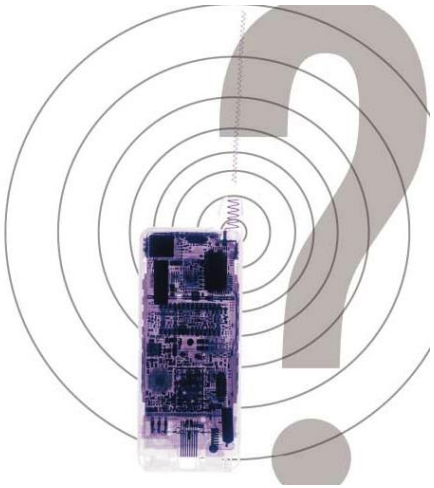

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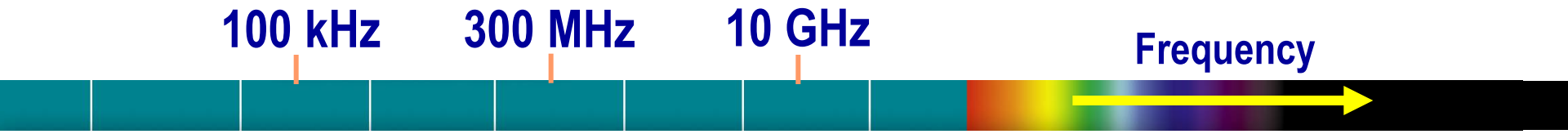
What do we know?

Mechanisms of interaction



Induced currents

Induced currents and heating

Surface heating

Non-thermal effects??

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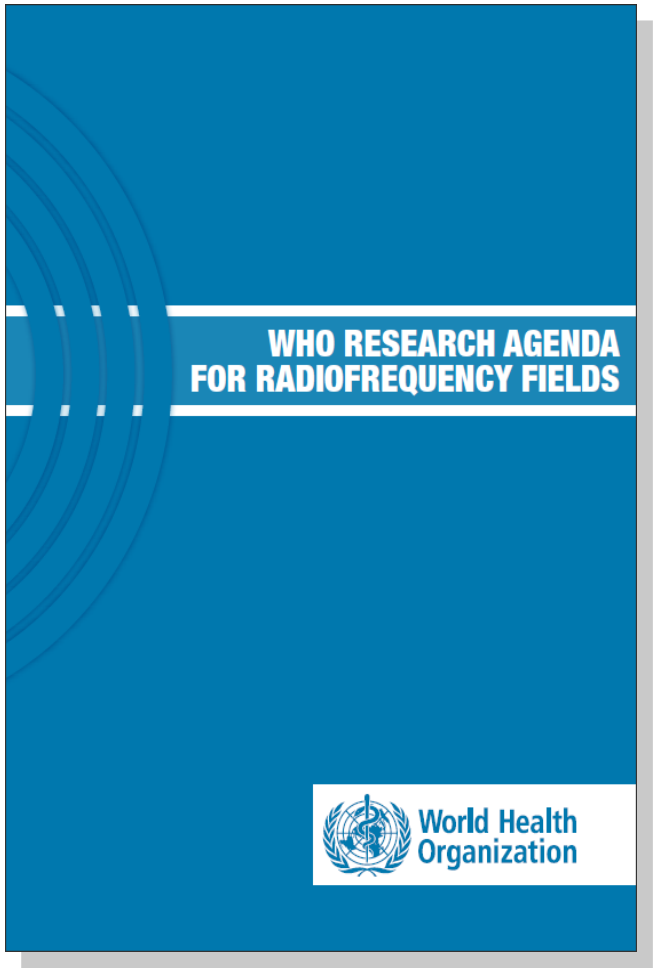
What type of research is needed?

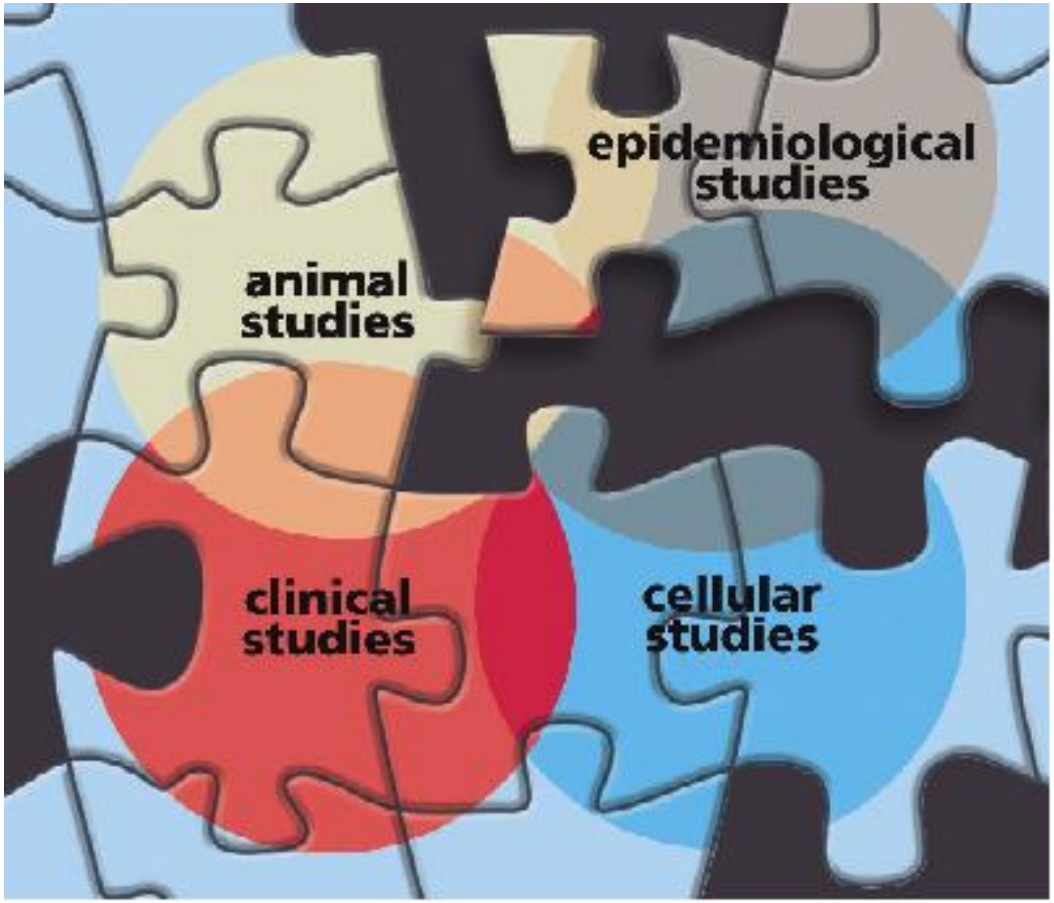
RF Research Agenda



- To promote research areas that have relevance to public health, and can
  - reduce scientific uncertainties: health effects research
  - respond to public concern through better risk communication: social science research
- Useful to researchers and funding agencies
- Uptake of the latest agenda in several countries

Research

Balance of studies needed



http://www.niehs.nih.gov/emfrapid/booklet/emf2002.pdf

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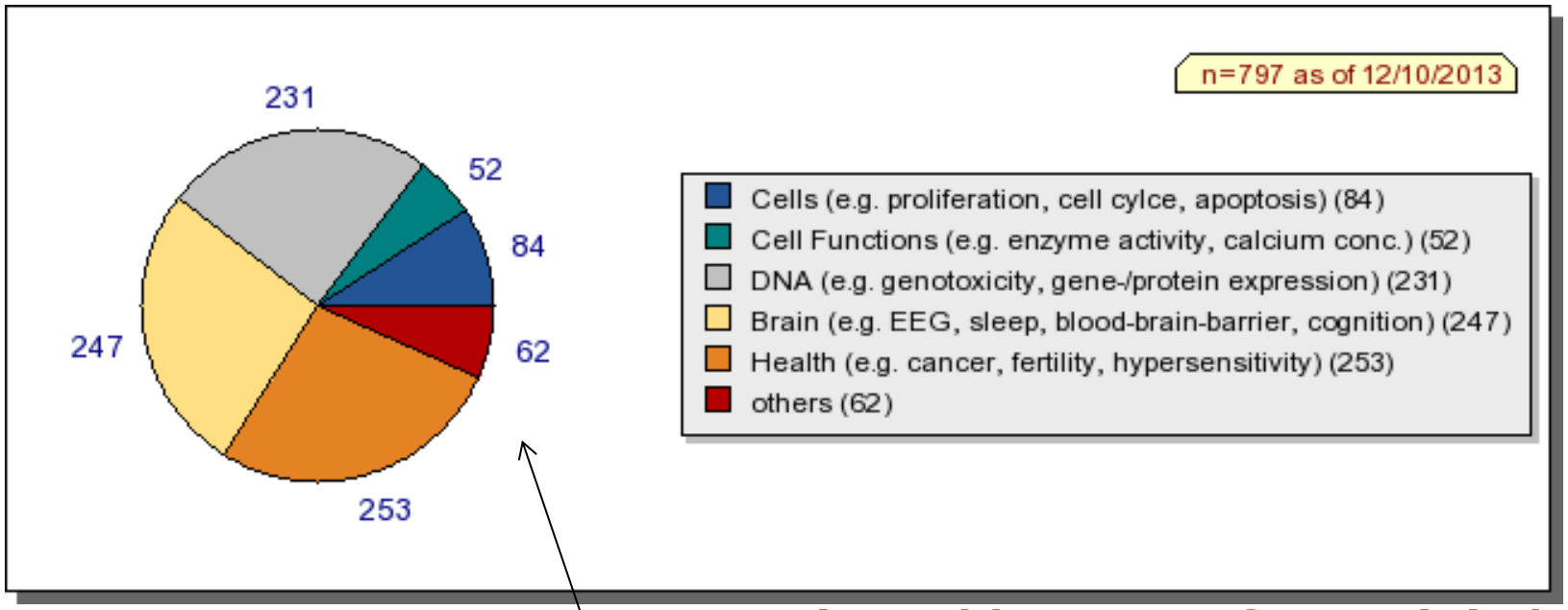
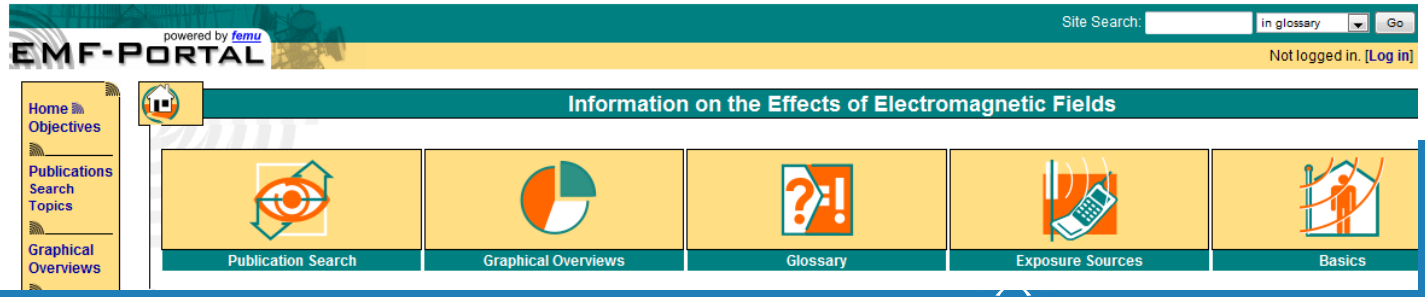
Laboratory Studies

Mobile phone related experimental studies



From http://www.emf-portal.de/



Laboratory Studies

- Cellular studies
  - Genotoxicity
  - Gene expression
- Animal studies
  - Cancer
  - Behaviour
  - BBB
  - Skin
- Human studies
  - Sleep
  - EEG
  - Hormones
  - EHS

Short-term effects

(WHO fact sheet 193, June 2011)

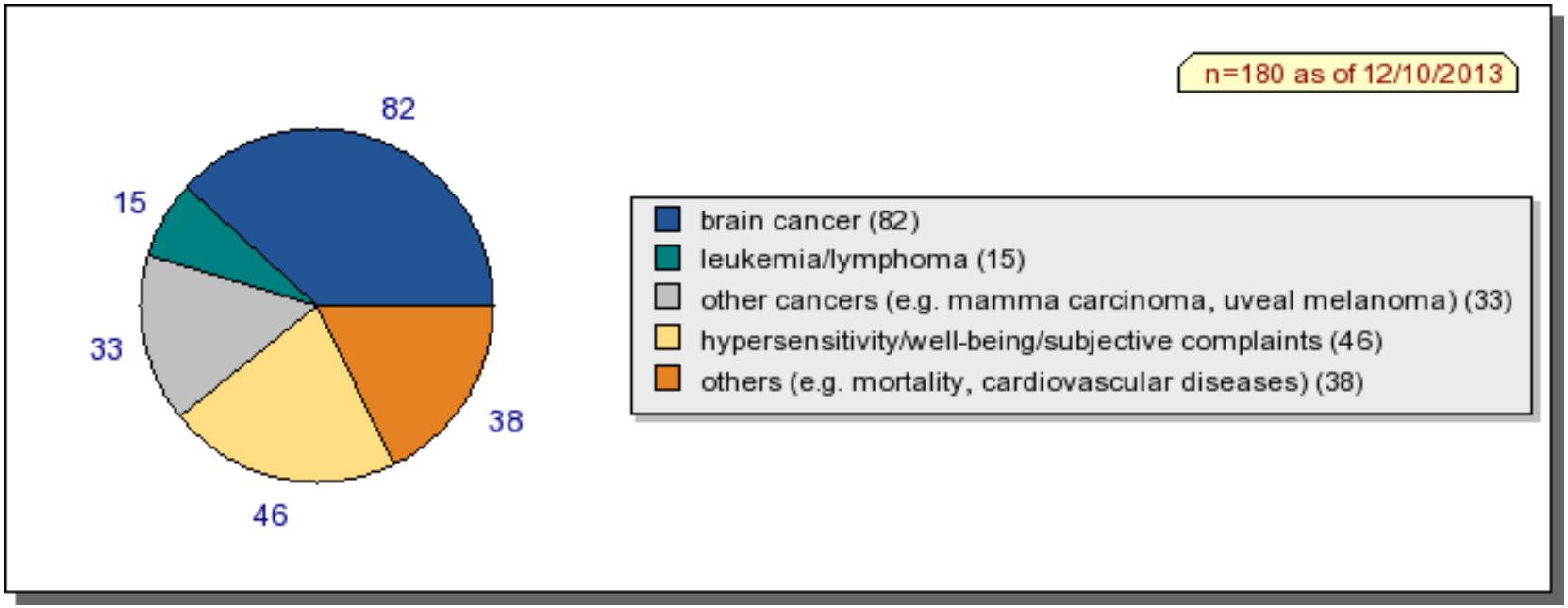
- To date, research **does not suggest any consistent evidence** of adverse health effects from exposure to RF fields at levels below those that cause tissue heating.

- Research has not been able to provide support for a causal relationship between exposure to EMF and self-reported symptoms, or “electromagnetic hypersensitivity”.

Epidemiological studies

Studies on mobile phones

Mobile phone related epidemiological studies



From http://www.emf-portal.de/

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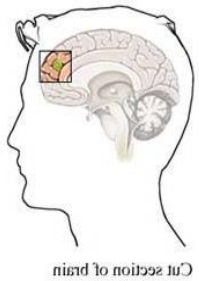
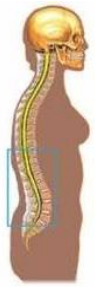
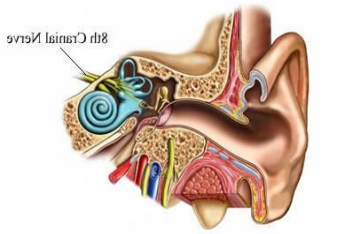
Epidemiological studies

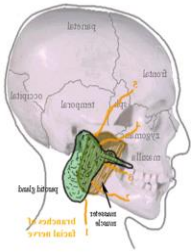
Studies on mobile phones

- Tumours in head and neck
  - Glioma, meningioma, acoustic neuroma, parotid gland









- Numerous studies on the use of mobile phones
  - Published: USA, Nordic countries, INTERPHONE, CEFALO
  - Ongoing: MOBI-Kids, COSMOS

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INTERPHONE study

(published 18 May 2010)

Published by Oxford University Press on behalf of the International Epidemiological Association

International Journal of Epidemiology 2010;1–20
doi:10.1093/ije/dyq079

Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case–control study

The INTERPHONE Study Group*

Corresponding author. Elisabeth Cardis; CREAL, Doctor Aiguader 88,
*List of members of this study group is available in the Appendix.

Accepted 8 March 2010

- **Cases:**
  - 2,765 gliomas
  - 2,425 meningiomas
  - 1,121 acoustic neuroma
  - 109 malignant parotid gland
- **Controls:**
  - 7,658

Long-term effects

(WHO fact sheet 193, June 2011)

- No increased risk of glioma, meningioma or acoustic neuroma with mobile phone use > 10 years
- Indications of increased risk of glioma for heavy users
  - But biases and errors prevent a causal interpretation
- No available data for long-term use (15-20 years)
- Studies on children ongoing

Organización Mundial de la Salud

Centro de prensa

Campos electromagnéticos y salud pública: teléfonos móviles

Nota descriptiva N°193
Junio de 2011

Datos y cifras

- El uso de teléfonos móviles se ha universalizado: en el mundo hay unos 4600 millones de contratos de telefonía móvil.
- El Centro Internacional de Investigaciones sobre el Cáncer ha clasificado los campos electromagnéticos producidos por los teléfonos móviles como posiblemente carcinógenos para los seres humanos.
- Hay estudios en curso para analizar más a fondo los posibles efectos a largo plazo del uso de los teléfonos móviles.
- En 2012, la OMS realizará una evaluación formal de los riesgos a partir de todos los resultados de salud estudiados en relación con campos de radiofrecuencias.

http://www.who.int/mediacentre/factsheets/fs193/es/index.html

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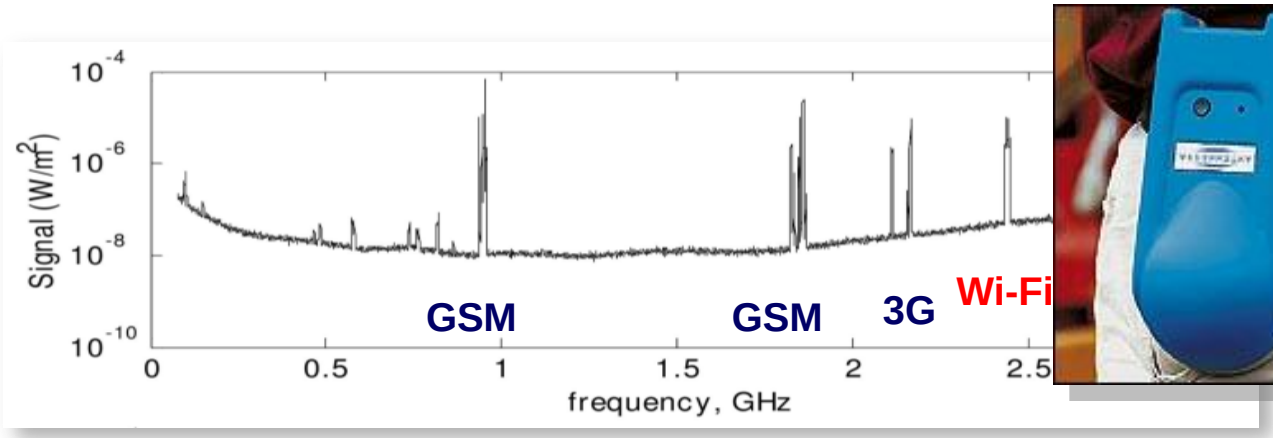
Epidemiological studies

Base stations and wireless networks

- Some studies have been performed
  - Well-being and performance
  - Cancer

- Difficulty of personal exposure assessment



Kenneth R. Foster, ***Radiofrequency exposure from wireless LANs utilizing WI-FI technology***. Health Phys. 92(3):280 –289; 2007

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Organización Mundial de la Salud

Campos electromagneticos (CEM)

Los campos electromagnéticos y la salud pública

Estaciones de base y tecnologías inalámbricas

Nota descriptiva N°304
Mayo 2006

Conclusiones

Teniendo en cuenta los muy bajos niveles de exposición y los resultados de investigaciones reunidos hasta el momento, no hay ninguna prueba científica convincente de que las débiles señales de RF procedentes de las estaciones de base y de las redes inalámbricas tengan efectos adversos en la salud.

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…. subject to proper siting

How do we evaluate

the health risk from EMF?

Health Risk Assessment

Problem Formulation

Hazard Identification

Review key research to identify any potential health problems that an agent can cause

Cancer

Exposure Assessment

Determine the amount, duration and pattern of exposure to the agent

Exposure-Response Assessment

Estimate how much of the agent it would take to cause varying degrees of health effects that could lead to illnesses

Risk Characterization

Assess the risk for the agent to cause cancer or other illnesses in the general population

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From V. Cogliano, Workshop on "Characterizing evidence in EMF risk assessment", Berlin, May 2006, http://evidence.pureres.net

Overview of the evaluation process

Cancer in humans

Sufficient evidence
Limited evidence
Inadequate evidence
Evidence suggesting lack of carcinogenicity

Cancer in experimental animals

Sufficient evidence
Limited evidence
Inadequate evidence
Evidence suggesting lack of carcinogenicity

Mechanistic and other relevant data

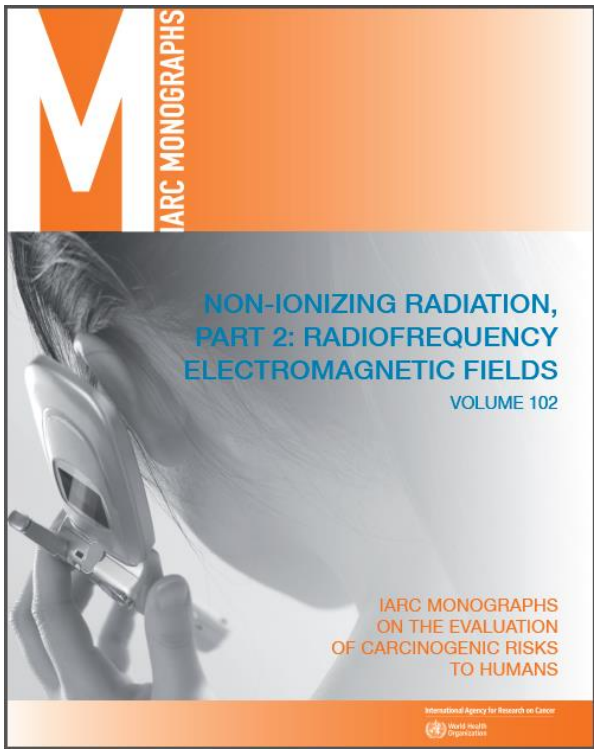
- Mechanistic data "weak," "moderate," or "strong"?
- Mechanism likely to be operative in humans?

Overall evaluation

Group 1	*Carcinogenic to humans*
Group 2A	*Probably carcinogenic to humans*
Group 2B	*Possibly carcinogenic to humans*
Group 3	*Not classifiable as to its carcinogenicity to humans*
Group 4	*Probably not carcinogenic to humans*

IARC Evaluation of Radiofrequency Fields
Volume 102 (2013)

- RF fields classified as "*possibly carcinogenic to humans*" *(Group 2B)* based on
  - **limited evidence in humans**, based on positive association between glioma and acoustic neuroma and exposure to RF-EMF from wireless phones (epidemiologic studies)
  - **limited evidence in experimental animals** for the carcinogenicity of RF-EMF
  - **weak mechanistic evidence** relevant to RF-EMF-induced cancer in humans
- Evidence for other exposures (e.g. base stations, Wi-Fi) and outcomes (other cancers) considered insufficient for any conclusion



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Agents Classified by IARC (950)

IARC Classification	Examples of Agents
Carcinogenic to humans (107) (usually based on strong evidence of carcinogenicity in humans)	Asbestos Alcoholic beverages Benzene Mustard gas Radon gas Solar radiation Tobacco (smoked and smokeless) X-rays and Gamma
Probably carcinogenic to humans (59) (usually based on strong evidence of carcinogenicity in animals)	Creosotes Diesel engine exhaust Formaldehyde Polychlorinated biphenyls (PCBs)
Possibly carcinogenic to humans (267) (usually based on evidence in humans which is considered credible, but for which other explanations could not be ruled out)	RF fields Coffee Gasoline engine exhaust Pickled vegetables ELF magnetic fields Styrene

Health Risk Assessment (cont'd)

International EMF Project

Problem Formulation

Hazard Identification

Review key research to identify any potential health problems that an agent can cause

Exposure Assessment

Determine the amount, duration and pattern of exposure to the agent

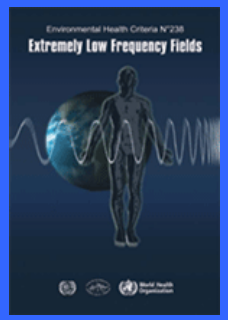
Exposure-Response Assessment

Estimate how much of the agent it would take to cause varying degrees of health effects that could lead to illnesses

Risk Characterization

Assess the risk for the agent to cause cancer or other illnesses in the general population

All studied outcomes



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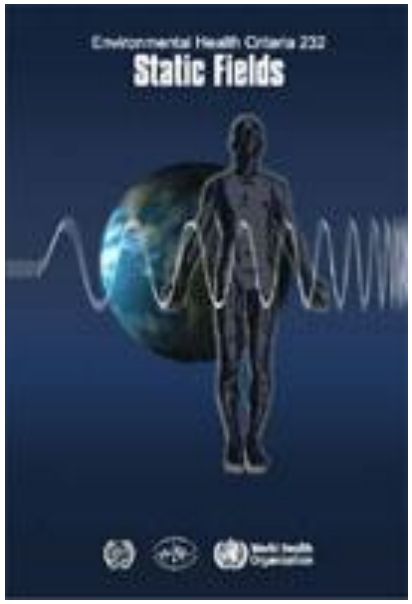
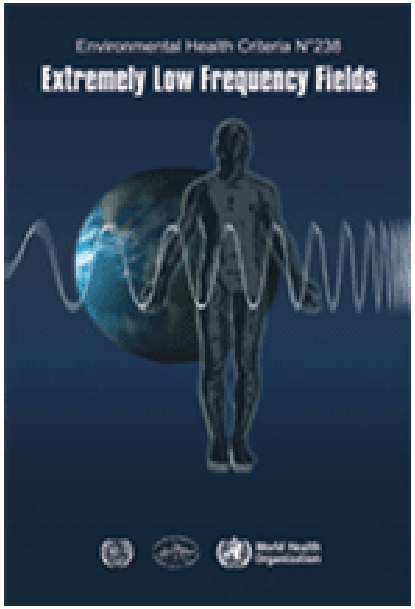
Environmental Health Criteria

Electromagnetic Fields



2006



2007

RF fields

2014

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Scope

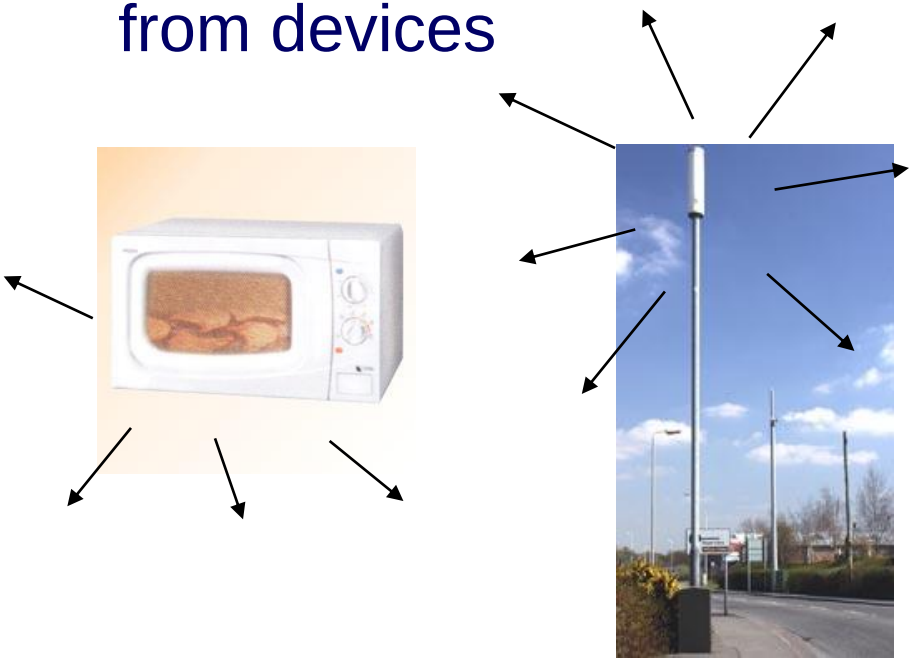
- Frequency range:
  - 100 kHz - 300 GHz
  - Include UWB, pulses, mm-waves
- Sources:
  - RFID, EAS, mobile telephony, radar, smart meters, …
- Health benefits not included
  - Hyperthermia, MRI, medical treatments, diathermy, RF ablation surgery
- Systematic review of scientific evidence of health risks
- Update on research recommendations
- Review of national RF policies

OUTLINE

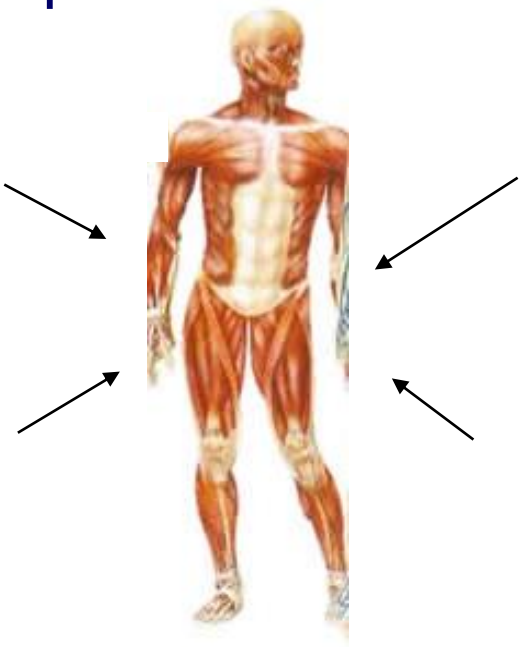
- Introduction
- Assessing the health risk
- **Managing the health risk**

Norms, Standards and Guidelines

- **Emission standards** have specifications that limit the EMF emissions from devices



- **Exposure standards** have specifications that limit EMF exposure to people



Relevant Authorities

Non-governmental and international organizations

- **Emission standards**
- **Measurements standards**

- **Exposure standards**

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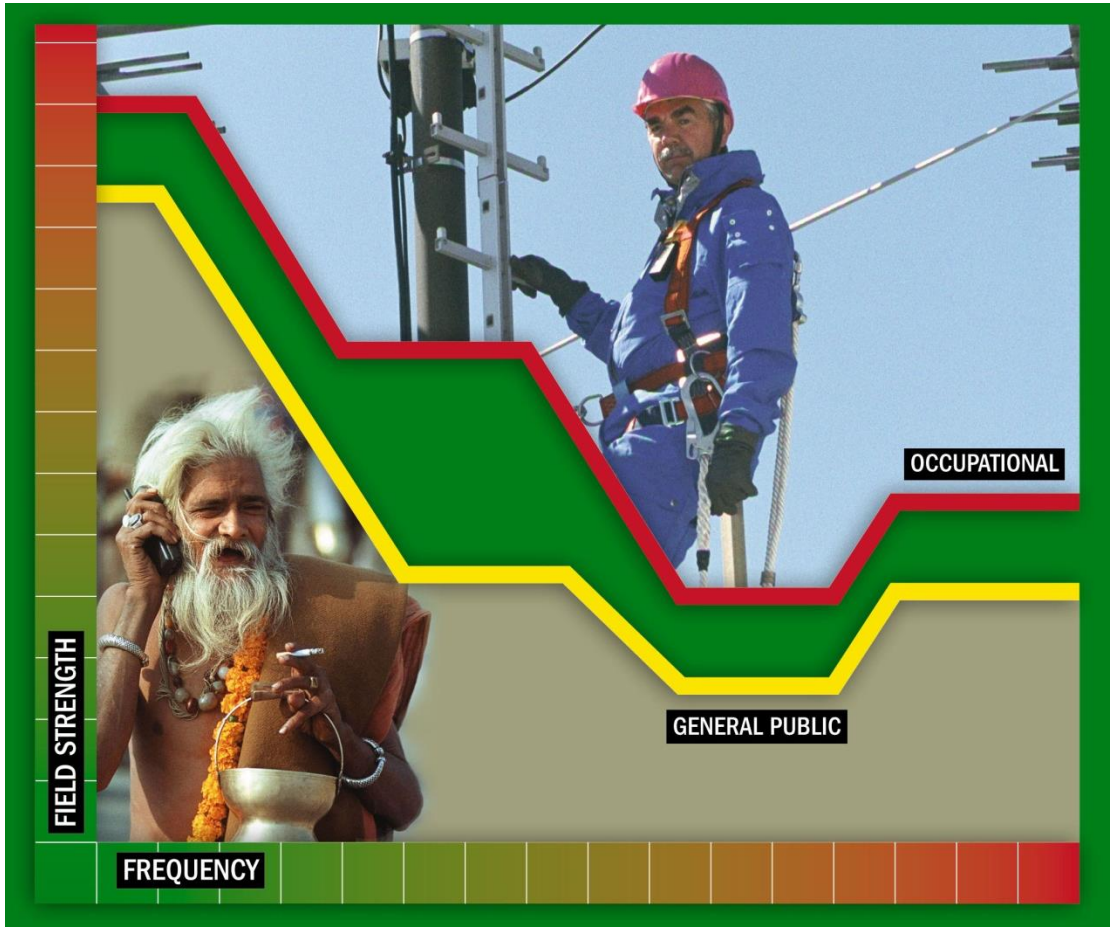
Reference Levels



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National management approaches

- Relevant authorities
  - National level

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República Federativa do Brasil — Imprensa Nacional

SEÇÃO 1

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Atos do Poder Judiciário

SUPREMO TRIBUNAL FEDERAL
PLENÁRIO
DECISÕES
Ação Direta de Inconstitucionalidade e
Ação Declaratória de Constitucionalidade

AG. REG. NA AÇÃO DIRETA DE INCONSTITUCIONALIDADE 4.071-5 (2)
PROCED. : DISTRITO FEDERAL
RELATOR : MIN. MENEZES DIREITO
AGTE.(S) : PARTIDO DA SOCIAL DEMOCRACIA BRASILEIRA - PSDB
ADV.(A/S) : AFONSO ASSIS RIBEIRO E OUTRO (A/S)
AGDO.(A/S) : PRESIDENTE DA REPÚBLICA
ADV.(A/S) : ADVOGADO-GERAL DA UNIÃO
AGDO.(A/S) : CONGRESSO NACIONAL

Decisão: Preliminarmente, o Tribunal, por maioria e nos termos do voto do Relator, rejeitou a admissão do *amicus curiae*, vencidos a Senhora Ministra Cármen Lúcia e os Senhores Ministros Carlos Britto, Celso de Mello e o Presidente. E, no mérito, por maioria, desproveu o recurso de agravo, vencidos os Senhores Ministros Marco Aurélio, Carlos Britto e Eros Grau. Votou o Presidente, Ministro Gilmar Mendes. Ausente, justificadamente, a Senhora Ministra Ellen Gracie. Plenário, 22.04.2009.

EMB.DECL.NA AÇÃO DIRETA DE INCONSTITUCIONALIDADE 2.791-3 (3)
PROCED. : PARANÁ
REL.ACOR. : MIN. GILMAR MENDES
RELATOR PARA O ACÓRDÃO : MIN. MENEZES DIREITO
EMBTE.(S) : GOVERNADOR DO ESTADO DO PARANÁ
ADV.(A/S) : PGE-PR - CESAR AUGUSTO BINDER
EMBDO.(A/S) : ASSEMBLEIA LEGISLATIVA DO ESTADO DO PARANÁ

Decisão: O Tribunal, por unanimidade, conheceu dos embargos. Em seguida, após o voto do relator, dando provimento aos embargos, no que foi acompanhado pelos Senhores Ministros Carlos Britto, Cezar Peluso e Ellen Gracie (Presidente), e dos votos dos Senhores Ministros Menezes Direito, Cármen Lúcia, Ricardo Lewandowski e Marco Aurélio, que os rejeitavam, o julgamento foi suspenso para colher os votos dos Senhores Ministros Joaquim Barbosa,

Atos do Poder Legislativo

LEI Nº 11.934, DE 5 DE MAIO DE 2009

Dispõe sobre limites à exposição humana a campos elétricos, magnéticos e eletromagnéticos; altera a Lei nº 4.771, de 15 de setembro de 1965; e dá outras providências.

O PRESIDENTE DA REPÚBLICA
Faço saber que o Congresso Nacional decreta e eu sanciono a seguinte Lei:

Art. 1º Esta Lei estabelece limites à exposição humana a campos elétricos, magnéticos e eletromagnéticos, associados ao funcionamento de estações transmissoras de radiocomunicação, de terminais de usuário e de sistemas de energia elétrica nas faixas de freqüências até 300 GHz (trezentos gigahertz), visando a garantir a proteção da saúde e do meio ambiente.

Parágrafo único. Estão sujeitos às obrigações estabelecidas por esta Lei as prestadoras de serviço que se utilizarem de estações transmissoras de radiocomunicação, os fornecedores de terminais de usuário comercializados no País e as concessionárias, permissionárias e autorizadas de serviços de energia elétrica.

Art. 2º Os limites estabelecidos nesta Lei referem-se à exposição:

I - da população em geral aos campos elétricos, magnéticos e eletromagnéticos; e

II - de trabalhadores aos campos elétricos, magnéticos e eletromagnéticos em razão de seu trabalho.

Art. 3º Para os fins desta Lei, são adotadas as seguintes definições:

I - área crítica: área localizada até 50 (cinqüenta) metros de hospitais, clínicas, escolas, creches e asilos;

II - campos elétricos e magnéticos: campos de energia in-

World Health Organization

National management approaches

- Relevant authorities
  - National level
  - Provincial level
  - Local level
    - Dispense building and planning permits
    - Direct contact with public and operators
    - May introduce further conservative measures based on politics rather than science

Local Authorities

Role	Possible responsibilities
Planning authority or regulator	Protect public health Authorise siting of transmitters Establish planning rules for transmitters Approve land use near transmitters Coordinate with other stakeholders
Landowner of transmitter site	Decide whether to lease site Act as a good neighbour Use position as landowner to encourage or promote local priorities.
Network operator	Operate radio telemetry network to monitor status of local infrastructure Operate mobile radio network to communicate with staff Operate WiFi network for public use Comply with regulatory requirements
Employer	Meeting occupational health and safety responsibilities for staff working near wireless network transmitters.
Source of information	Lead public communications about health issues. Respond to questions about wireless networks

Management Options

Reduce concern

Reduce uncertainty

Reduce exposure

- No action
- Communication
- Research
- Planning measures
- Engineering measures
- Exposure limits
- ….

Risk Perception and Communication

WHO Risk Handbook

For programme managers who need basic information on EMF risk perception, communication and management

Available in English

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www.who.int/emf

World Health Organization

OUTLINE

- Introduction
- Assessing the health risk
- Managing the potential risk
- **Conclusions**

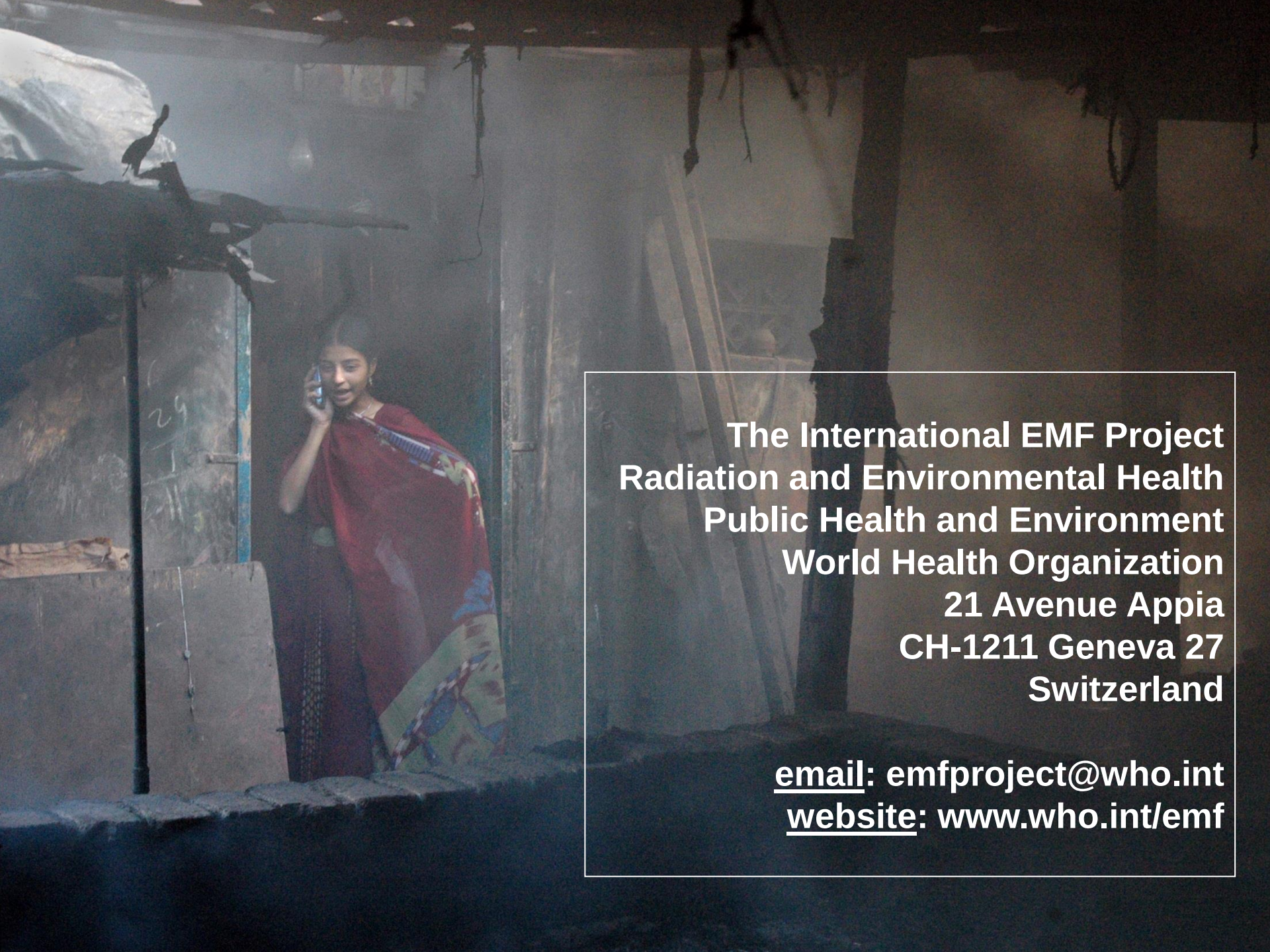
Challenges to governments….

- Rapidly evolving RF technologies
- Launched on the market before health evaluation
- Disparities in risk management measures and regulations around the world
- Concern from the public

Conclusions

- Need for clear roles and responsibilities in government on this topic
- Need for adoption and compliance of health-based standards
- Need for a public information program and dialogue with stakeholders
- Need for promoting research to reduce uncertainty

We are a "global village"



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