International EMF Project

International Health Risk Assessments

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MTHR Research Seminar
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WHO and RADIATION

CLUSTER

Sustainable Development and Healthy Environment (SDE)

DIVISION

Protection of the Human Environment (PHE)

UNIT

Radiation and Environmental Health (RAD)

Ionizing Radiation Safety

International EMF Project

INTERSUN

Why so much concern about RF?

Mobile telecommunications save hundreds of lives daily

Fear of health effects, of new technology or lack of understanding of how it works?

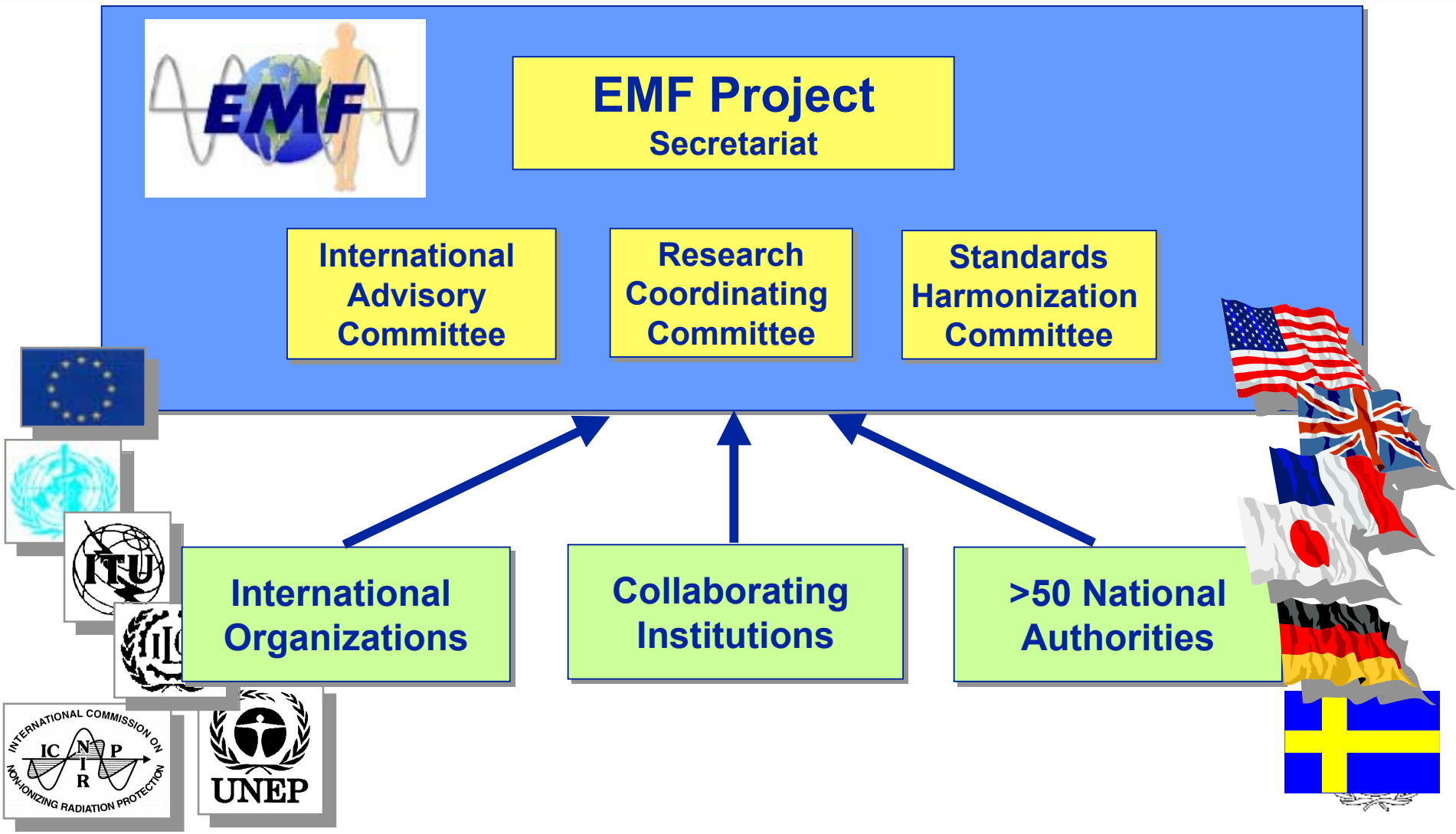
International EMF Project

- Established in 1996
- To assess health and environmental effects of exposure to electromagnetic fields in the frequency range from 0 to 300 GHz
- A multinational, multidisciplinary effort to create and disseminate information appropriate to human health risk assessment for EMF
- Coordinated by WHO

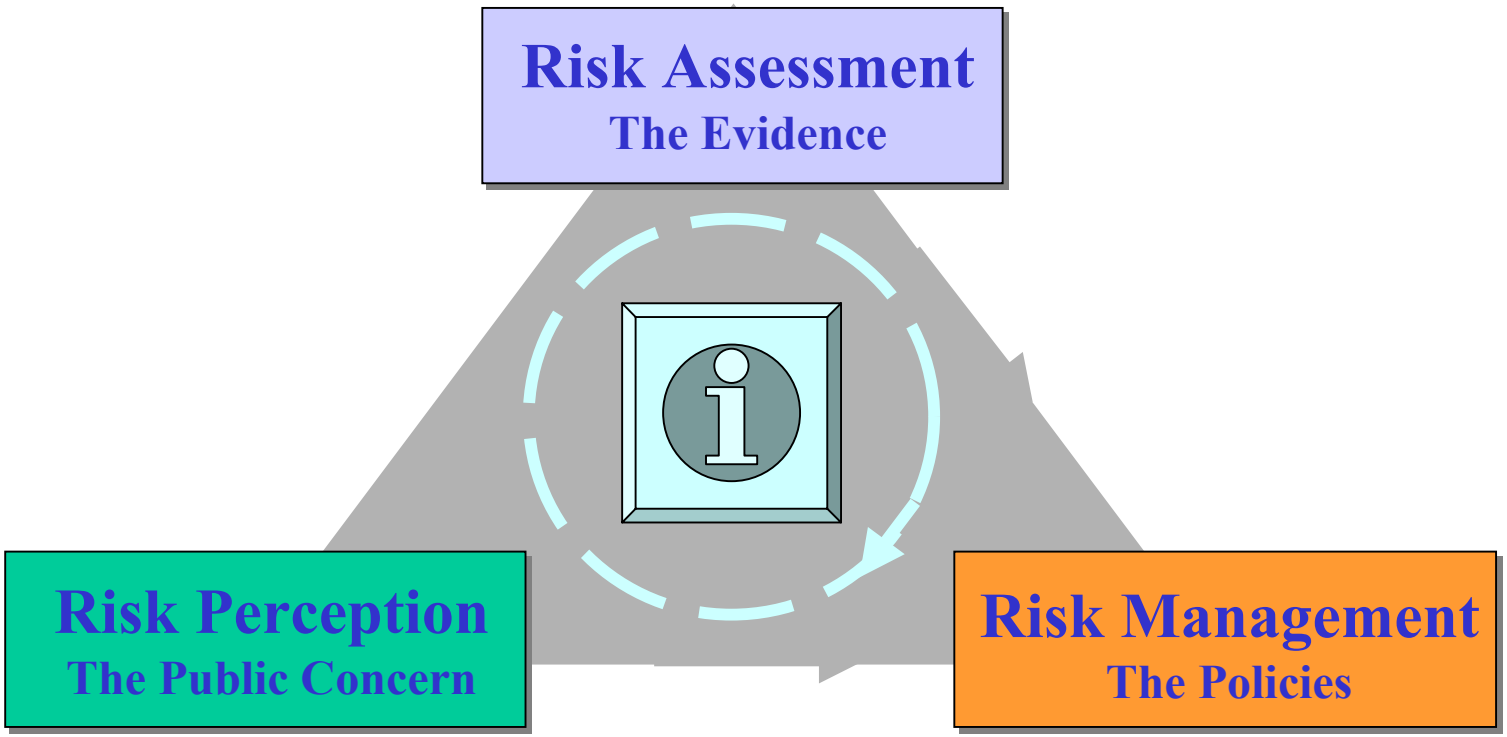
Objectives

- Evaluate scientific evidence
  - Report on current status of knowledge
  - Identify gaps in knowledge needing to be filled by focused research to make better health risk assessments
- Promote and facilitate research programs (with national programs such as MTHR)
- Conduct health risk assessments and risk estimation, and develop policy options
- Provide information on standards, management programs and advice to national authorities

Structure


EMF
EMF Project
Secretariat
International Advisory Committee
Research Coordinating Committee
Standards Harmonization Committee
ITU
UNEP
INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION
ICNIRP
International Organizations
Collaborating Institutions
>50 National Authorities

EMF: How to Address?



WHO EMF Project

Scientific Evidence
Risk Assessment

- **Environmental Impact**
- Review of EMF Impacts on Environment
- WHO Task Groups
- Information on Environmental Impacts For Future Development Projects

- **International Scientific Reviews**
- Health Status Reports Research Gaps
- Research Co-ordination
- Collection of Database
- WHO/IARC Task Group Reviews
- Health Risk Assessment
- WHO Environmental Health Criteria

Standards and Policies
Risk Management

- **Standards**
- Review of World Standards
- Develop Frameworks for
  - Standards
  - Precautionary Measures
  - Model Legislation
- Develop EMF Management Programme for
  - Public
  - Workers (NIOSH)
- Global EMF Standard

Information and Training
Risk Perception

- **Information Publications**
- Web site in Multiple Languages
- Fact Sheets in Multiple Languages
- Peer review articles and Proceedings of meetings
- Training Programmes
  - Internet
  - Seminars

  in Multiple Languages

- **Risk Perception and Communication**
- Seminars and W/G Reviews
- WHO Task Groups
- Risk Handbook

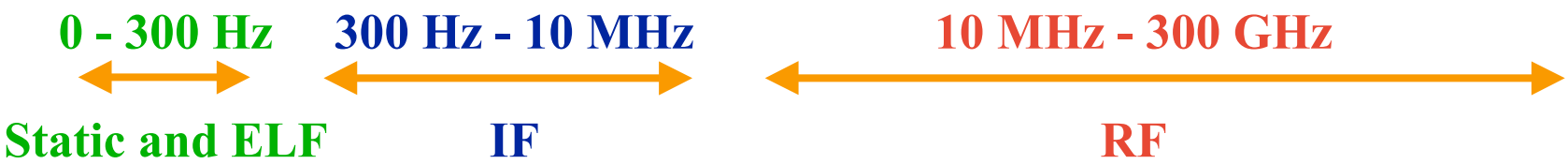
National Authorities and Public

Biological and Health Effects
Working definitions for health risk assessments

- A **biological effect** is a measurable physiological response to EMF exposure ….not necessarily hazardous…this must be evaluated

- An **adverse health effect** is a biological effect outside the body's normal range of physiological compensation that is detrimental to health or well-being

International Scientific Reviews



- Static and ELF fields, Bologna, 1997
- Intermediate frequency fields, Maastricht, 1999
- RF fields, Munich, 1996
- RF pulse-modulated fields, Erice, 1999

- Psychosocial impacts of EMF exposure, Graz, 1998
- Environmental impacts of EMF, Ismaning, 1999
- Adverse temperature levels in the human body, Geneva, 2002
- Application of the Precautionary Principle to EMF, Feb. 2003
- Child sensitivity to EMF, Istanbul, June 2004
- Hypersensitivity to EMF Prague, 2004

International Scientific

WHO Process

- Working groups on specialised topics
- Special meetings in countries having large research programs but results not translated into English, eg Russia and China
- WHO does NOT issue recommendations without above process …..

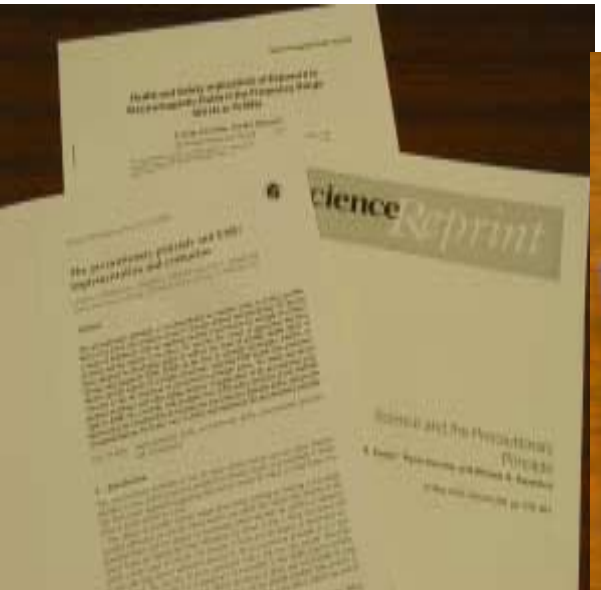
International Scientific Reviews

Outputs

➢ Peer-reviewed journal reports on health effects

➢ Proceedings of meetings

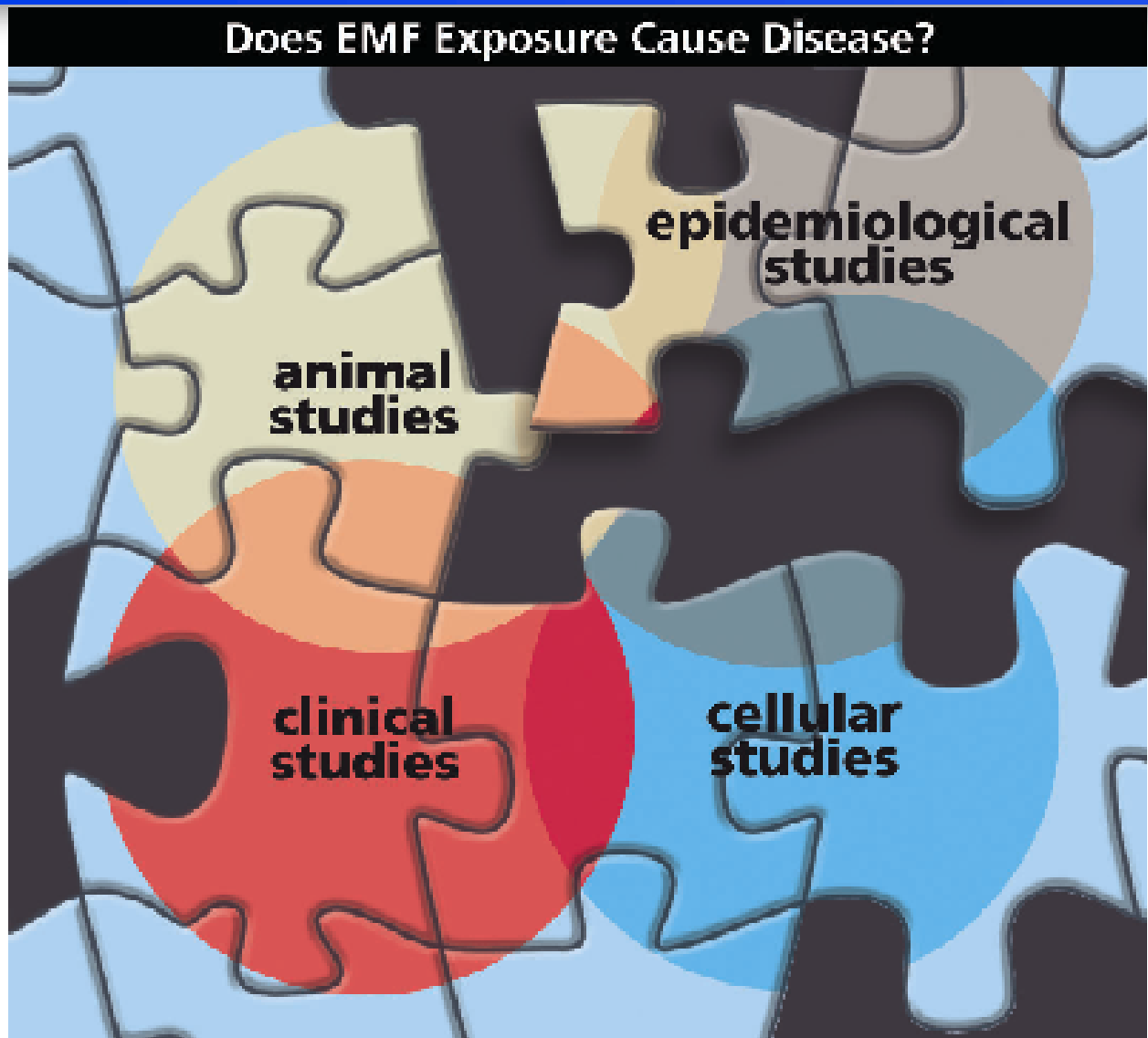
➢ Fact Sheets



WHO risk assessment criteria

- In-depth, weight-of-evidence, critical review and evaluation of ALL EMF research world wide
- Study reports MUST have descriptions of methods used, all data, and analyses of results and conclusions
- All studies MUST be replicated or be in agreement with similar studies
- All studies, with either positive or negative effects, MUST be assessed equally

RESEARCH
Balance of studies needed

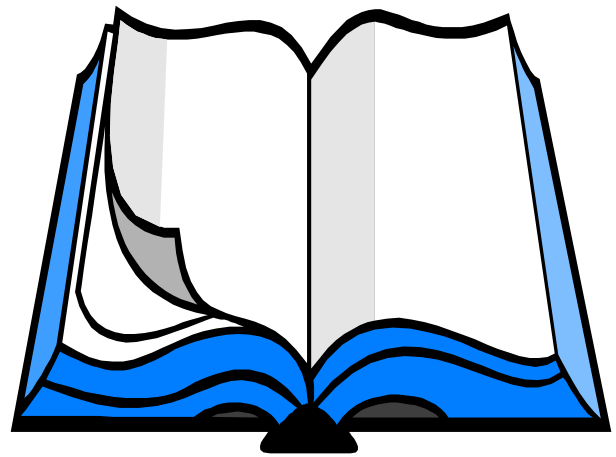


WHO Environmental Health Criteria

Static and ELF	RF
IARC 2001-2002 EHC 2002-2004	IARC 2005-6 EHC 2006-7
	

EHC Contents

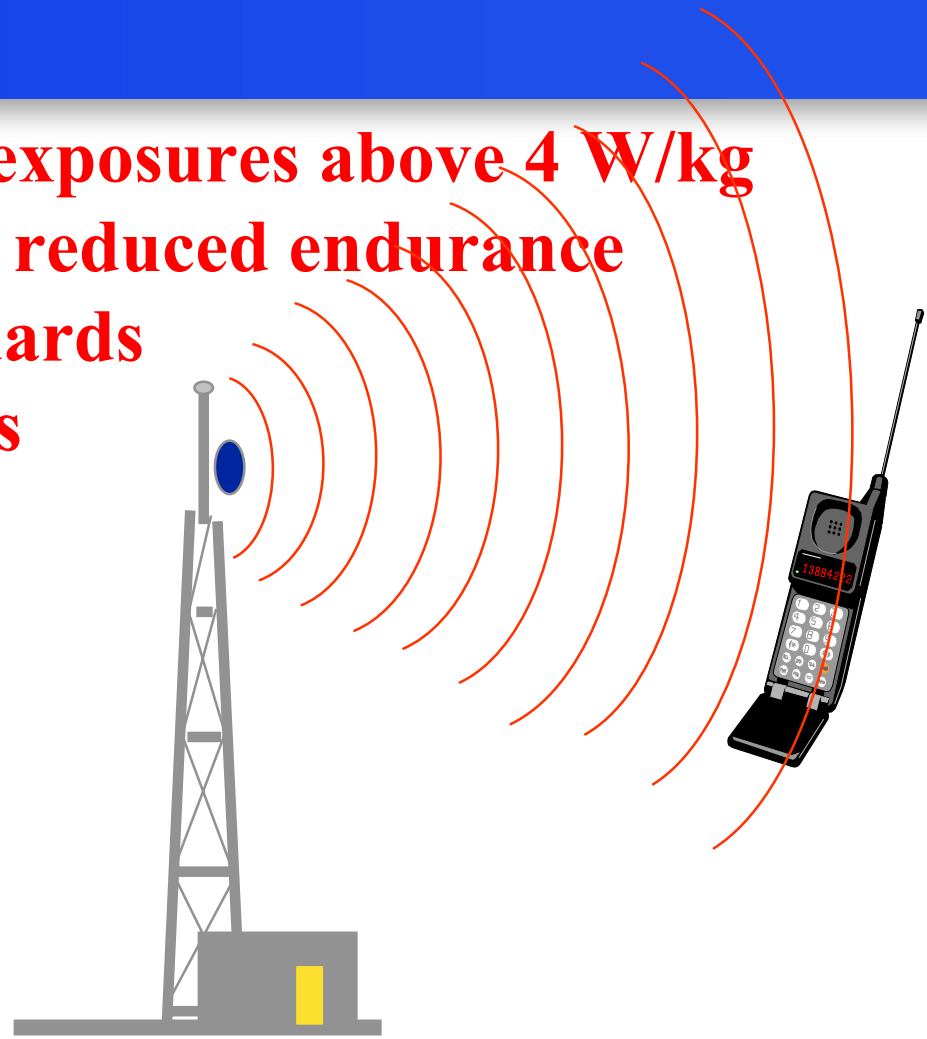
- Executive summary
- Introduction
- Sources of exposure and measurement
- Environmental levels and human exposure
- Internal dosimetry and biophysical mechanisms
- Effects on laboratory test systems
- Effects on humans
  - Cancer
  - Reproduction
  - Cardiovascular
  - Neurodegenerative
  - Behavioural
  - Hypersensitivity
- Methodological issues health risk assessment
- Evaluation of dose-response
- Evaluation of human health risks and risk estimation
- Protective measures and policy options (including precautionary approach)
- Conclusions & recommendations
- Further research
- References



See new WHO RF Research Agenda

RF Fields

- RF health effects are due to exposures above 4 W/kg causing behavioural changes, reduced endurance
- Basis for International standards
- No health effects below limits



Effects not established:

- ⇨Memory loss
- ⇨Cancer
- ⇨Blood pressure changes
- ⇨Blood brain barrier
- ⇨Altered reaction times
- ⇨Subjective effects (Hypersensitivity)

Major risk related to mobile phone use

RF fields

What is the way forward?

- Coordinated and focused research program: see WHO's new RF research agenda (www.who.int/emf)
- Risk assessment program
- Advise national authorities
- Process and information must be transparent and disseminated in a way that is user-friendly to the public, workers, government and industry

WHO RF Research Agenda

WHO meeting June 2003

Exposure Assessment

⇨ Develop personal dosimeters (for epi studies and exposure assessment of populations…for risk estimation

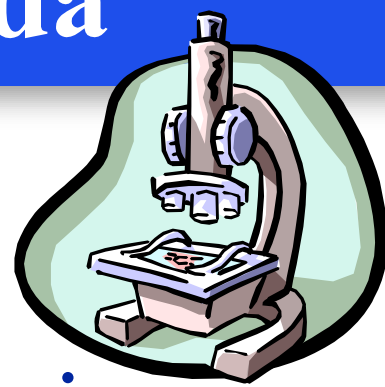
⇨ Exposure assessment specific for children

WHO RF Research Agenda

Interaction mechanisms

- There are no novel hypotheses to test relevant to health risk assessment
- More work on micro-dosimetry at the cellular or sub-cellular levels might give new information about the targets of RF

WHO RF Research Agenda



Animal, Cell Studies

- ⇨ Effects on immune system – follow-up on Russian studies suggesting RF-induced disruption of antigenic structures in brain tissue
- ⇨ Blood brain barrier and neural damage
- ⇨ Test new signals in large scale chronic studies
- ⇨ Soon to be implemented: NTP study
- ⇨ Stress and heat shock proteins (e.g. HSP-27) induction and phosphorylation

WHO RF Research Agenda

Epidemiology

⇨ **Ongoing: IARC study of brain and parotid tumours**

⇨ **New: Prospective cohort study of mobile phone users**

⇨ **New: Base station epidemiological studies – tie in with feasibility (UK research program)**

WHO RF Research Agenda

Human studies

Ongoing: Reaction times, memory, performance

New: Sleep, headaches, hypersensitivity

WHO RF Research Agenda

Overarching Principles

⇨Use commercially relevant RF signals

⇨Test interactions with other agents

⇨Study impact of age of animal,

⇨Dose patterns (regimen, duration, intermittency)

In Human Studies

⇨Include children in study designs

⇨Use populations with well-defined exposures

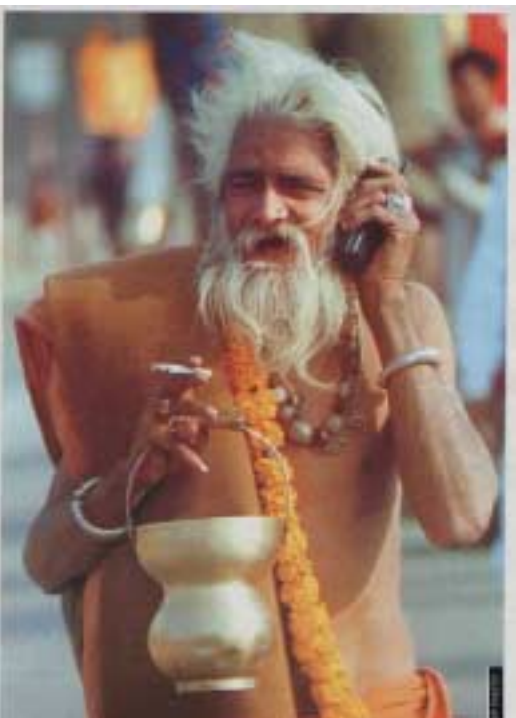
Key issues

Exposure from Base Stations

- Is it possible to do a valid study of exposure to RF sources, and distinguish the effect of base station exposures from other RF sources?
- Are there any low-level long term effects?

Key issues

International Cohort Study of Mobile Phone Users



- Follow-up to IARC Interphone case-control study
- WHO EMF Project currently assisting in formation for long-term follow-up

International Cohort Study of Mobile Phone Users

Need

- Epidemiological studies provide most relevant evidence for Risk Assessment and highest weight in weight-of-evidence approach
- With huge number of mobile phone users worldwide any health effect could be an important public health issue
- Current IARC Interphone studies focus on head and neck tumors and not other cancers or diseases
- Cohort Study of Mobile Phone Users highest priority on WHO research agenda
- Not being addressed by any ongoing research

International Cohort Study of Mobile Phone Users

Unique opportunity

- Provide long term surveillance
- Address diseases of concern not in current research
- Document prevalent, but rapidly changing exposure
- Unique resource to address future, unanticipated issues
- Timely given widespread use of technology and disease latency
- Most powerful epidemiological design
- Data which toxicology can't provide
- Top priority on the WHO research agenda

Key issues

Effects of EMF on Children

- Stewart Report (UK: IEGMP 2000)
- Health Council of the Netherlands (2002)
- EC: COST 281 (2002)
- WHO EMF Project workshop (Istanbul, June 2004)

Key issues

Hypersensitivity to EMF

- COST 244 (Graz, 1998)
- WHO EMF Project workshop (Prague, 2004)

Electromagnetic Hypersensitivity

Symptoms

- Nervous system symptoms (e.g. sleep disturbances, fatigue, stress)
- Skin symptoms (e.g. facial prickling, burning sensations, rashes)
- Various body symptoms (e.g. pain and ache in muscles)
- Eye symptoms (e.g. burning sensations)
- Various less common symptoms that include ear, nose, and throat problems, as well as digestive disorders
- Symptoms faced by EHS individuals are certainly real

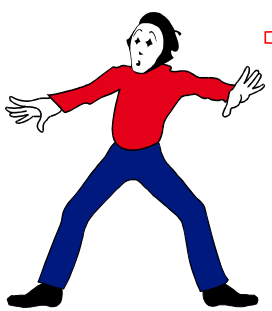
Elements of Risk Perception

- Extent of health risk
- Probability of occurrence
- Uncertainty
- Ubiquity
- Pattern of exposure
- Delayed effect
- Inequity and injustice
- Voluntary vs. involuntary exposure

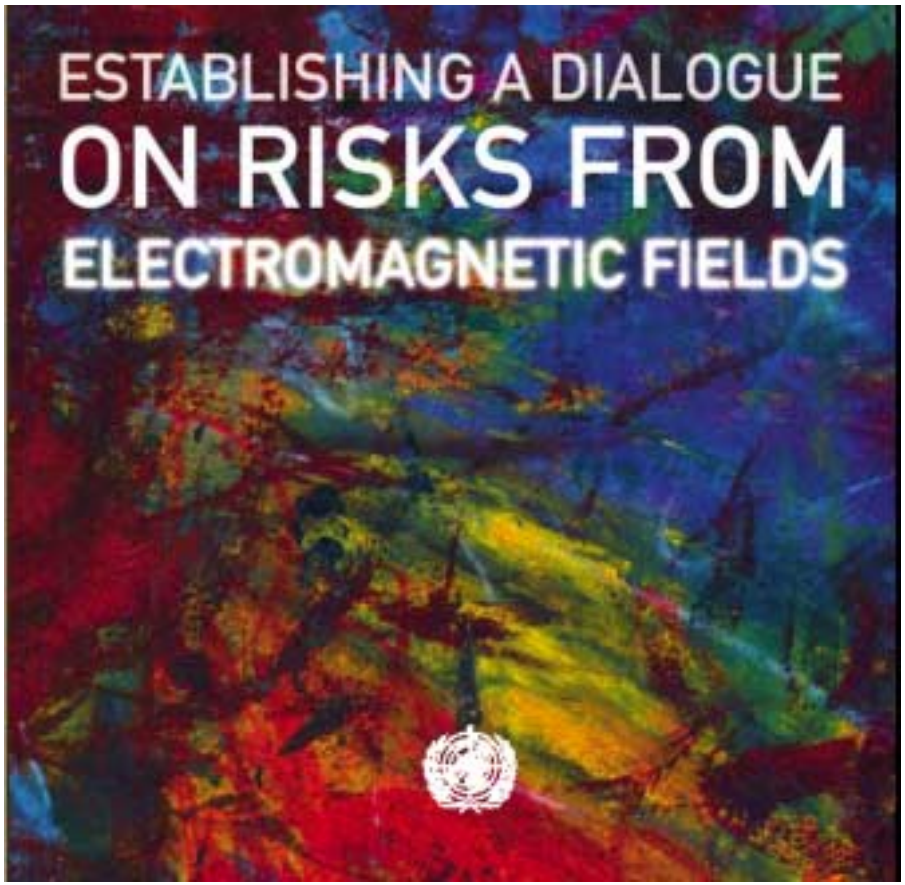
Risk Perception and Communication

- Crucial to establish a dialogue between all individuals and groups impacted by EMF facilities

- Effective dialogue includes
  - consultation with stakeholders
  - acknowledgement of scientific uncertainty
  - consideration of alternatives
  - fair and transparent decision-making process



Risk Perception and Communication



- For program managers needing information on EMF risk perception, communication and management
- Based on international seminars and working groups

WHO's Precautionary Framework

Objectives

- to **anticipate** and respond to possible threats before introduction of an agent or technology
- to **address public concerns** that an uncertain health risk is minimised after introduction of an agent
- to **develop and select options** proportional to the degree of scientific uncertainty, the severity of harm, the size and nature of the affected population and the cost

WHO Precautionary Framework

- An **OVERARCHING approach** that involves precautionary measures at each step of the risk management process
- A **general and practical framework** for any potential health risk

Risk Evaluation

Conventional: for known risks

- Focus on known
- Risk assessment information adequate
- Weight of evidence evaluation
- Uncertainties and assumptions identified

Precautionary

- Focus on key uncertainties and limitations of knowledge
- Prevention prior to accumulation of complete evidence

Option Generation

Conventional

- Designed to meet a limit or guideline
- Driven by technological feasibility

Precautionary

- From “do nothing” to “ban”
- Can include individual choice and behavioural modification

N.B. All options should be evaluated with rigour

Limits and Precautionary Measures

Conventional

- Based on evidence from established science
- Incorporates reduction factors from known adverse health effects

Precautionary

- Reduce exposure while maintaining benefits
- Code of practice: ways of keeping exposures low
- Can incorporate cost-benefit consideration

N.B. The WHO framework does NOT provide a basis for replacing science-based guidelines

RANGE OF RISK MANAGEMENT OPTIONS

DECISION TO TAKE NO FORMAL ACTION is an appropriate response in cases where the risk is considered very small, or the evidence is insufficient to support formal actions. This response is often combined with watchful waiting, i.e. monitoring the results of research and measurements and the decisions being made by standard-setters, regulators, and others.

COMMUNICATION PROGRAMMES can be used to help people understand the issues, become involved in the process and make their own choices about what to do.

RESEARCH fills gaps in our knowledge, helps to identify problems, and allows for a better assessment of risk in the future.

CAUTIONARY APPROACHES are policies and actions that individuals, organizations or governments take to minimize or avoid future potential health or environmental impacts. These may include voluntary self-regulation to avoid or reduce exposure, if easily achievable.

REGULATIONS are formal steps taken by government to limit both the occurrence and consequences of potentially risky events. Standards with limits may be imposed with methods to show compliance or they may state objectives to be achieved without being prescriptive.

LIMITING EXPOSURE or banning the source of exposure altogether are options to be used when the degree of certainty of harm is high. The degree of certainty and the severity of harm are two important factors in deciding the type of actions to be taken.

TECHNICAL OPTIONS should be used to reduce risk (or perceived risk). These may include the consideration of burying power lines, or site sharing for mobile phone base stations.

MITIGATION involves making physical changes in the system to reduce exposure and, ultimately, risk. Mitigation may mean redesigning the system, installing shielding or introducing protective equipment.

COMPENSATION is sometimes offered in response to higher exposures in a workplace or environment. People may be willing to accept something of value in exchange for accepting increased exposure.

From Establishing a Dialogue on Risks from Electromagnetic Fields, WHO 2002

The International EMF Project (EMF)

International EMF Project

"...through its International EMF Project, the World Health Organization is pooling resources and knowledge concerning health effects of exposure to EMF."

ON THIS SITE, YOU WILL BE ABLE TO FIND DETAILS ON THE FOLLOWING QUESTIONS:

- What is the International EMF Project?
- What research on the health effects of EMF is being done?
- What are the standards and guidelines on exposure to EMF?
- What are electromagnetic fields?
- What WHO publications are available on this topic?
- What meetings are of interest?

WHAT'S NEW!

New RF research agenda - July 2003
More information

WHO response
to inquiries about Epidemiological Studies Around Base Stations
More information

Precautionary Framework: Update on WHO's Activities
More information [PDF 7KB]

Precautionary Framework for Public Health Protection
We invite public comment on the draft. Please address comments to emfproject@who.int
Full report [PDF 117KB]

NEXT STEPS

- ⇨ Present framework to highest levels in WHO
- ⇨ Include generic case studies

Anticipated outcome

- ⇨ Better public health protection
- ⇨ Broad stakeholder participation
- ⇨ Better public acceptance of health policies

Further Information

Home page: www.who.int/emf/