

# WIRELESS RADIATION & CHILDREN'S HEALTH

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# WHO I AM...

## EDUCATION AND WORK

- Two doctorates and docentship in biochemistry
- Independent expert; actively advising and lecturing
- 22 years (1992-2013) at STUK – Radiation and Nuclear Safety Authority in Finland
  - 2003-2007 as Head of Radiation Biology Laboratory
  - 2000-2013 as Research Professor
- Assistant Professor at Harvard Medical School, USA; 1997-1999
- Guangbiao Prof. at Zhejiang Univ. Med. Sch., Hangzhou, China; 2006-2009
- Visiting Prof. at Swinburne Univ. Technology, Melbourne, Australia; 2012-2013

# WHO I AM...

## EXPERT EXPERIENCE

- 20 years of experimental work on EMF and health
- Testified
  - Canadian Parliament's House of Commons' hearing in 2015
  - Minister of Health and Family Welfare of India in 2014
  - US Senate Appropriations Committee hearing in 2009
- Member of 2011 IARC Working Group for classification of the carcinogenicity of cell phone radiation
- Advised e.g.: Parliament of Finland; National Academies, USA; World Health Organization; Bundesamt für Strahlenschutz, Germany; International Commission on Non-Ionizing Radiation Protection (ICNIRP); Swiss National Foundation; The Netherlands Organization for Health Research and Development;

# CELL PHONES WERE NOT TESTED FOR HUMAN HEALTH HAZARD BEFORE MARKETING

- In early 1980s communications technology developed for US Department of Defense was put into commerce
- US Food and Drug Administration (FDA) allowed cell phones to be sold without pre-market testing for human health hazard
- FDA rationale – the so-called “low power exclusion”
- This “rationale” continues to be applied to all new generations of wireless communication, including the 5G, resulting in no health risk testing of new technologies before commercializing to general public

# WIRELESS RADIATION

- Often different sources of radiation are not properly differentiated in presentations and the same term of RF-EMF is used in a confusing way
- Sources of RF-EMF are e.g.
  - **Cell phones** – most of our exposure comes from cell phones
    - Talking
    - Surfing internet
    - Tethering
  - **Cell towers** – very low exposures as compare with cell phones
  - **Wi-fi routers** - very low exposures as compare with cell phones

# DANGEROUS OR NOT DANGEROUS

# NO CONSENSUS ON RF-EMF

March 31, 2015

The identification of scientific consensus is precisely where the debate about wireless radiation becomes so convoluted, Emilie van Deventer, head of the World Health Organization's International Electromagnetic Field Project, said. Established by the WHO nearly 20 years ago, the project aims to assess the health effects of low-level radiation, like the radiation emitted by the Wi-Fi base stations around campus.

Although the project has repeatedly concluded that wireless network routers and base stations have no measurable health effects, the volume of information on both sides of the argument has maintained the debate this long, vanDeventer said.

“The data is gray. It’s not black and white,” van Deventer said of research on these health effects. “There is no consensus, it’s true. There’s a big group and a little group, but it’s still two groups. I can’t tell you that there’s one group that is completely correct.”



# NO REAL SCIENTIFIC DEBATE

- **'The Round-Table Initiative'** I proposed it on Feb. 10, 2013
- Major players, invited to participate, refused to debate the issue:
  - **BioInitiative** – considered it as “counter-productive” to engage with the ICNIRP and the industry
  - **ICNIRP** – “We do not consider that participation in the suggested Round Table would bring any added value to our science-based approach”
  - **MMF** – “...we don't feel that it would be appropriate at this time to participate in the 'Roundtable' as we are already involved in the European Commission's Stakeholder Dialogue Group on EMF...”



# ECHO CHAMBER

- In news media, the term '**echo chamber**' is a metaphorical description of a situation in which information, ideas, or beliefs are amplified or reinforced by communication and repetition inside a defined system.
- This, **echo chamber**, is what is happening right now with the debate over the possibility of health risks of the radiation emitted by the wireless communication devices
- Cause of confusion for general public and decision-makers

# SELF-PERPETUATING 'ECHO CHAMBERS' ON RF-EMF & HEALTH ISSUE

- Scientists & Activists on the 'no – effects – team'
  - e.g. ICNIRP, SCENIHR, ICES
- Scientists & Activists on the 'yes – effects – team'
  - e.g. BioInitiative, ICEMS, EHT, SSMAAs
- Governments & Industry - 'we follow the WHO team'
  - MMF, GSMA
- EXCEPTION
  - 2011 IARC evaluation of the RF-EMF carcinogenicity

# ICNIRP, WHO EMF PROJECT & ENVIRONMENTAL HEALTH CRITERIA

- The most influential ‘echo chamber’ is ICNIRP, a “private club” where the current members select and appoint new members
- ICNIRP members play a lead role in the preparation of the Environmental Health Criteria for the RF-EMF that will determine the future developments of the wireless technologies
- ICNIRP, the self-appointing NGO, has no accountability at all – nobody controls its activities (not for Col disclosures, not for errors in science)
- Can the “private club” - ICNIRP - be fully trusted with the development of the EHC, job that is certainly being lobbied by the telecoms?

# PROBLEMATIC SAFETY STANDARDS

- No information whether/how cell phone radiation affects biochemistry of humans
- No certainty that safety standards protect all users from anything besides thermal effects
- Any equipment radiating below currently set safety standards is automatically considered safe, which might be misleading
- Compliance with the safety standards is currently used as an excuse to stop research funding and to continue untamed deployment of new wireless technologies, without any health-related testing
- Non-thermal effects exist but are refused to be acknowledged and studied in depth
  - Epidemiology and sleep EEG studies provide compelling evidence for the existence of non-thermal effects (=low level exposure effects)

# IARC 2011

- 30 invited experts divided into four sub-groups
  - Dosimetry
  - Epidemiology
  - Animal studies
  - Mechanistic laboratory in vitro studies
- Decisions by a consensus or by a simple majority
- The vast majority of 30 experts voted for the classification of cell phone radiation as a possible carcinogen (Group 2B)

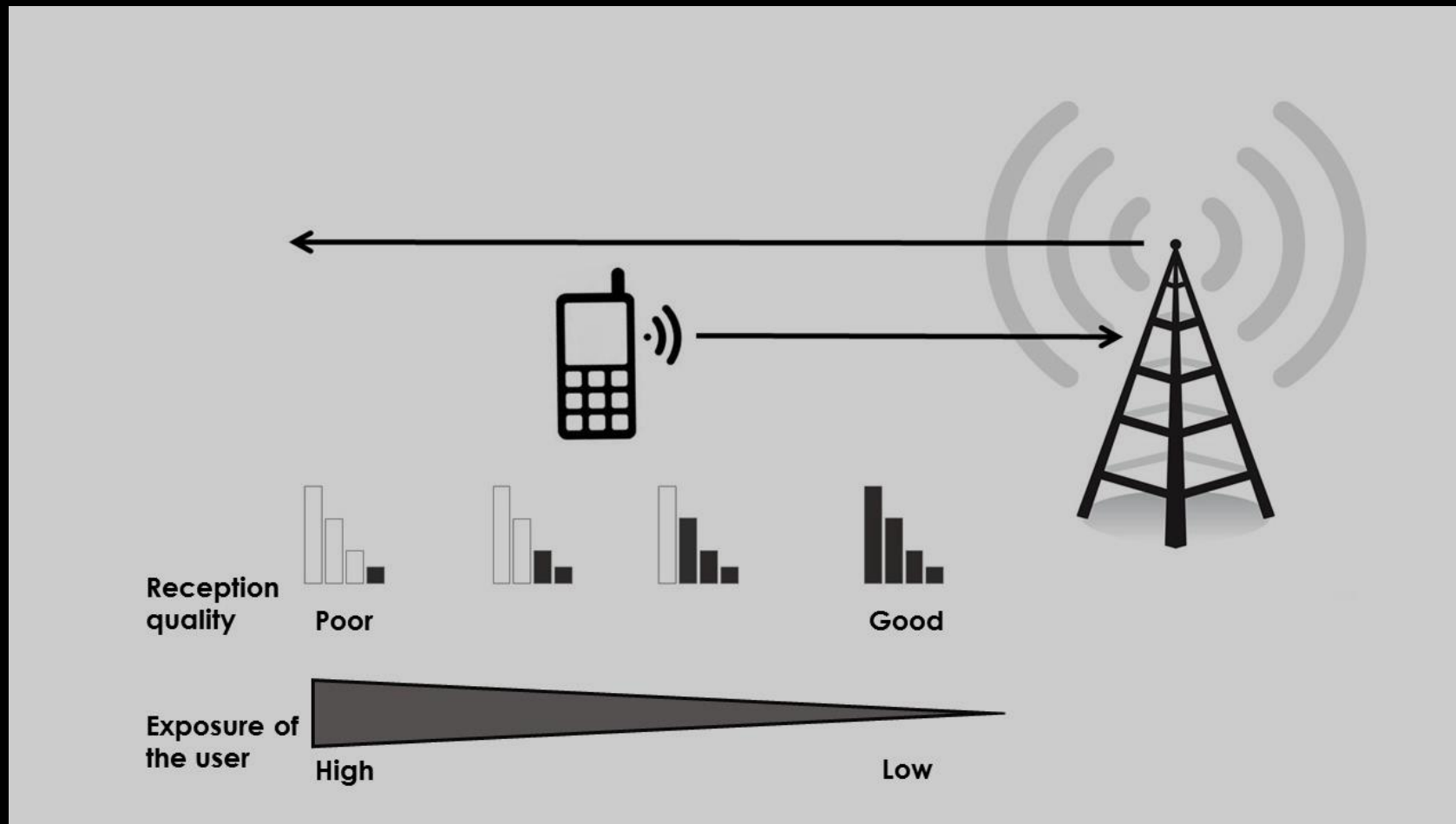
# EPIDEMIOLOGICAL EVIDENCE INDICATES CANCER RISK

- IARC classification was based on the results of **Interphone** and **Hardell** studies
- In 2014, a new epidemiological study was published - the French **CERENAT**
- The French study reached similar conclusions as Interphone and Hardell previously – **long term avid use of cell phone increases a risk of developing brain cancer**
- **Interphone 2016** (Grell et al.) analysis of full data confirms location of cancer in most exposed part of brain
- Now, there are **three replications of the same epidemiological type of study, the case-control study, that all suggest the cell phone radiation might increase risk of developing brain cancer**

# ALL EPIDEMIOLOGY STUDIES HAVE COMPLETELY UNRELIABLE EXPOSURE DATA

- Length of calls or length of phone subscription with service provider or saying whether you ever or never used cell phone, does not inform about the real exposure of the cell phone user.
- Using the above "exposure data", persons with very different radiation exposures are placed in the same exposed group for statistical evaluation.
- This leads to underestimation of the cancer risk in all epidemiology studies
  - Ongoing cohort study COSMOS collects exposure data as length of calls

# LENGTH OF CALL DOES NOT SAY "MUCH" ABOUT RADIATION EXPOSURE





# HOW PROBABLE ARE HEALTH EFFECTS OF CELL PHONE RADIATION

- IARC 2011 – **possible** cancer
- Current evidence, in 2016, on cancer – rather **probable** than possible
- Cancer will remain **rare** disease
- Wireless radiation might be acting solely as **co-carcinogen**
  - hence very slow increase in cancer statistics in spite of huge number of users
  - impact of latency difficult to estimate
- Other diseases – too limited evidence to draw any reliable conclusions

# HUMAN STUDIES

- The vast majority are “feelings” studies
  - Subjects asked how they feel and do they feel when radiation is on/off
  - **EHS must exist** – question is only what is radiation cut-off level
  - Otherwise EMF would be the only factor not causing individual sensitivity
  - Problem of EHS – studied by psychologists not physiologists – wrong methods
  - WHO definition of health – includes “mental and social well-being”
- Lack of studies examining biochemical responses of human tissues (!)
  - Single skin proteomics study
  - Two studies examined glucose metabolism in the brain

# DNA DAMAGE, GENOTOXICITY, CANCER

- NTP study fueled debate on genotoxicity of mobile phone radiation
- Scientifically unfounded “rush to conclusions” on genotoxicity and cancer
- DNA “damage” does not automatically mean that the RF radiation is genotoxic
- DNA damage occurs also spontaneously and is repaired
- No studies to show what is the fate of the RF-induced “DNA damage”
- Is DNA damaged by RF or is RF impairing repair of spontaneous DNA damage?
- Is DNA damage repaired or does it persist in further generations of cells?
- Considering the efficiency of DNA repair mechanisms in cells, claims that mobile phone radiation is genotoxic, are not proven yet
- We do not know if mobile phone radiation exposure associated DNA damage leads to genotoxicity and mutagenicity or whether it is repaired

# WI-FI STUDIES

- Lack of studies relevant to human health risk estimate
- EMF Portal specialized database in Germany
  - Epidemiological studies – 24
  - Experimental studies – 54
- Some recent examples of epidemiological studies
  - Guxens et al 2016 – 2354 cases; no effect
  - Calvente et al. 2016 – 123 cases; no effect
  - Abad et al. 2016 – 462 cases; no effect “*may be due to small sample size*”
  - Roser et al. 2016 – 439 cases; no effect
  - Schoeni et al. 2015 – 439 cases; memory affected
- No real radiation exposure data – children and parents questionnaires
- Variety of bias unaccounted for
- **We do not know whether anything will happen, or will not happen, to the health following years of exposures**

# INVOKING THE PRECAUTIONARY PRINCIPLE

“...Whether or not to invoke the Precautionary Principle is a decision exercised where **scientific information is insufficient, inconclusive, or uncertain** and where **there are indications** that the possible effects on environment, or human, animal or plant health may be **potentially dangerous** and **inconsistent with the chosen level of protection...**”

# JUSTIFICATION FOR INVOKING THE PRECAUTIONARY PRINCIPLE FOR CELL PHONES

Scientific information is insufficient, inconclusive, or uncertain

- IARC classification as possible carcinogen (Group 2B)

There are indications that the possible effects on human health may be potentially dangerous

- epidemiological studies, Interphone, Hardell and CERENAT, show an increased risk of brain cancer in long-term avid users

Inconsistent with the chosen level of protection

- epidemiological studies, showing increased risk in long-term avid users, were generated in populations using regular cell phones, compliant with the current safety standards = current safety standards are insufficient to protect users

# JUSTIFICATION FOR INVOKING THE PRECAUTIONARY PRINCIPLE FOR WI-FI

- Scientific information on biological and health effects of wi-fi is insufficient to make any informed decision
- Claims that wi-fi is dangerous or that wi-fi is not dangerous have no sufficient basis in the currently available scientific evidence
- However,
  - Considering young age of children
  - Length of the period they will be exposed
  - Cell phone radiation is possibly carcinogenic
  - Historically, cell phone radiation was considered as “safe” by the FDA but it is turning out to be otherwise
- It is wise to be proactive and precautionary and to recommend that **only wired internet will be used in schools**, while the scientific data is being collected

# THE IMPACT OF IMPLEMENTING THE PRECAUTIONARY PRINCIPLE

- Claims that implementation of the Precautionary Principle (PP) will bring us back to “caves” is pure demagoguery
- **Precaution** does not equal **Prevention**
- Wi-fi can be used but does not need to be everywhere and all the time
- **Precautionary use of only wired internet in schools will not impair learning**
- Strong opposition from telecom industry because PP may cause
  - Technology providers can be made responsible to prove their product is safe
  - Requirement of making more efficient (less radiation emissions) technology
  - Limiting current rampant and uncontrolled deployment of wireless networks
- Implementation of PP will create new knowledge through research
- Implementation of PP will create new jobs in research and technology



# CONCLUSIONS

- IARC classification of cell phone radiation as a possible carcinogen is a sufficient reason for invoking Precautionary Principle
- Claims that the current safety standards protect all users are not supported by the scientific evidence
- Schools should use only wired internet as a precautionary measure
- Users should be better informed about the current scientific uncertainty and advised to limit exposures whenever possible and feasible and strongly discouraged from keeping cell phones close to body (in pockets)
- Real radiation exposure data should be used in epidemiological and human studies
- ALARA principle should be implemented for cell phone radiation exposures
- Activity of WHO EMF Project and membership of ICNIRP should be overhauled and scientists with diverse opinions should be included in evaluation of science to facilitate a real scientific debate instead of the current “ICNIRP echo chamber”