

# 5G JA TERVEYS

# SUURI JA TUTKIMATON

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# WHO I AM... EDUCATION AND WORK

- Two doctorates
  - Molecular biology (DSc), Jagiellonian University, Krakow (1983)
  - Biochemistry/cell biology (PhD), Helsinki University (1990)
- Dosentti (biochemistry), Helsinki University (1992 - )
- Currently Retired; Independent Expert; actively advising and lecturing
- 22 years (1992-2013) at STUK
  - 2003-2007 as Head of Radiation Biology Laboratory
  - 2000-2013 as Research Professor
- Assistant Professor at Harvard Medical School, USA; 1997-1999
- Guangbiao Professor at Zhejiang University, Hangzhou, China; 2006-2009
- Visiting Professor at Swinburne Univ. Technology, Melbourne, Australia; 2012-2013



# WHO I AM... EXPERT EXPERIENCE

- 20 years of experimental work on EMF and health
- Testified, advised, lectured at:
  - ARPANSA, Australia, 2018
  - Polish Ministry of Digitization; 2016
  - Canadian Parliament's House of Commons' hearing; 2015
  - India's Minister of Health and Family Welfare; 2014
  - USA Senate Appropriations Committee hearing; 2009
- Member of the 2011 International Agency for Research on Cancer (IARC) 30-Experts 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;

# PERPETUAL DÉJÀ VU

- **The Beginning**

- 1980s communications technology developed for US Department of Defense was put to civilian commercial use
- Food and Drug Administration (FDA) allowed cell phones to be sold without pre-market testing for human health hazard - the “*low power exclusion*”

- **30 years later...**

- In 2011, based on the post-deployment research, International Agency for Research on Cancer (IARC) classified cell phone radiation as a possible human carcinogen
- Earlier assumed lack of health hazard appears to be false
- Smart phones (e-pads, laptops) have completely changed human body exposure patterns

- **Fast forward to Today...**

- 5G technology is being **deployed without prior testing** for human health hazard

- **The Future is unknown...**



# ICNIRP - INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION

**ICNIRP is prone to provide unreliable and skewed evaluation of the scientific evidence on EMF and health for the following reasons:**

- it is a “**private club**” where current members elect new members, without need to publicly justify the selection
  - lack of accountability before anyone
  - lack of transparency of their activities
  - complete lack of supervision of its activities
- **skewed science evaluation** because of the close similarity of the opinions of all members of the Main Commission and all of the other scientists selected as advisors to the Main Commission.

# SAFETY LIMITS HAVE TO BE BASED SOLELY ON THE AVAILABLE, CORRECTLY INTERPRETED, SCIENCE

- ICNIRP under-plays the significance of the research data
- Activists over-estimate the significance of the research data
- ICNIRP and Activists – both mislead by interpreting scientific evidence '*to suit their pre-conceived opinions*'
- There is enough of scientific evidence to support the Precautionary Principle, without the need for misleading interpretation of data
- Children, because of their known higher sensitivity to environmental factors, should be exposed as little as possible, as a precautionary measure
  - E.g. no wireless internet in schools and daycare centers
  - E.g. age limit for smart phone ownership



# EFFECTS OF CO-EXPOSURES

- Co-carcinogen studies show effects (just few performed) – cell phone radiation might potentiate effects of carcinogenic chemicals or radiation
- 6 co-carcinogenicity studies in animals were used as supportive evidence for IARC 2011 classification of cell phone radiation as possible carcinogen
- Study of Tillmann et al. 2010 was replicated and confirmed by Lerchl et al. 2015
- **Lack of co-carcinogenicity studies (!)**

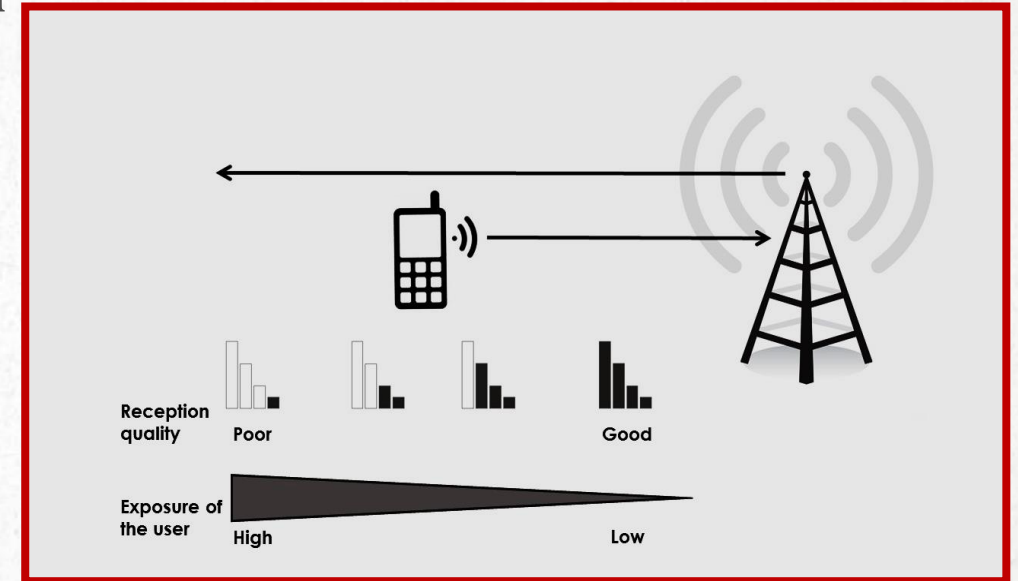
# EPIDEMIOLOGY CASE-CONTROL STUDIES SUPPORT POSSIBLE/PROBABLE BRAIN CANCER RISK

- International Agency for Research on Cancer 2011 classification was based on the results of Interphone and Hardell studies
- Currently, the four case-control epidemiological studies suggest the cell phone radiation increases risk of developing brain cancer in avid users
  - Regular user (!) – no problem at all but... definition: 1 call/week for 6 months
  - Avid user = ca. 30 minutes/day for 10+ years
  - Interphone 40%; Hardell 170%, CERENAT 100%, Canadian Interphone 100% increase in glioma risk = glioma is and remains '*rare disease*'
- Interphone 2016 analysis of full data confirms location of cancer in the most exposed parts of brain
- **NOTICE: all case-control studies underestimate risk of brain cancer because of poor radiation dosimetry**



# PROBLEM: EPIDEMIOLOGY CASE-CONTROL STUDIES HAVE NO RADIATION EXPOSURE DATA...

- Surrogate for radiation exposure – minutes of using cell phone
- Such surrogate leads to underestimation of the effect
- Two persons talking for the same length of time may have entirely different radiation exposure because of the different proximity to cell tower
- Persons with dramatically different radiation exposure were analyzed as if having the same exposure (!)



## ...HOW IT WILL APPLY TO 5G MICROCELLS NOBODY KNOWS

# **BRAIN CANCER TRENDS AND CELL PHONE USAGE TRENDS DO NOT MATCH**

**HUGE INCREASE IN CELL PHONE USE OVER DECADES  
BUT NO EQUALLY DRAMATIC BRAIN CANCER RISE**

**WHY?**



# LESZCZYNSKI: HYPOTHESIS OF INDIVIDUAL SENSITIVITY TO EMF

- **Health of the majority of human population will not be affected by exposures to EMF**
- Only individuals with higher sensitivity to EMF (≠EHS!) will be affected
- Individual sensitivity to EMF may be modulated by other environmental factors
- Corroborating observations supportive for the hypothesis:
  - Epidemiology – brain cancer was rare disease and appears to remain rare disease because **only highly-sensitive persons respond (?)**
  - Toxicology – NTP study exposed animals to huge doses of EMF but only few rats developed cancer because **only highly sensitive animals responded (?)**
- **The PROBLEM** – we do not know who might be more than average sensitive to EMF and we do not study this issue at all (EHS psychological studies do not suffice)

# WHEN TO INVOKE 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...”*



# REASONS FOR INVOKING PRECAUTIONARY PRINCIPLE

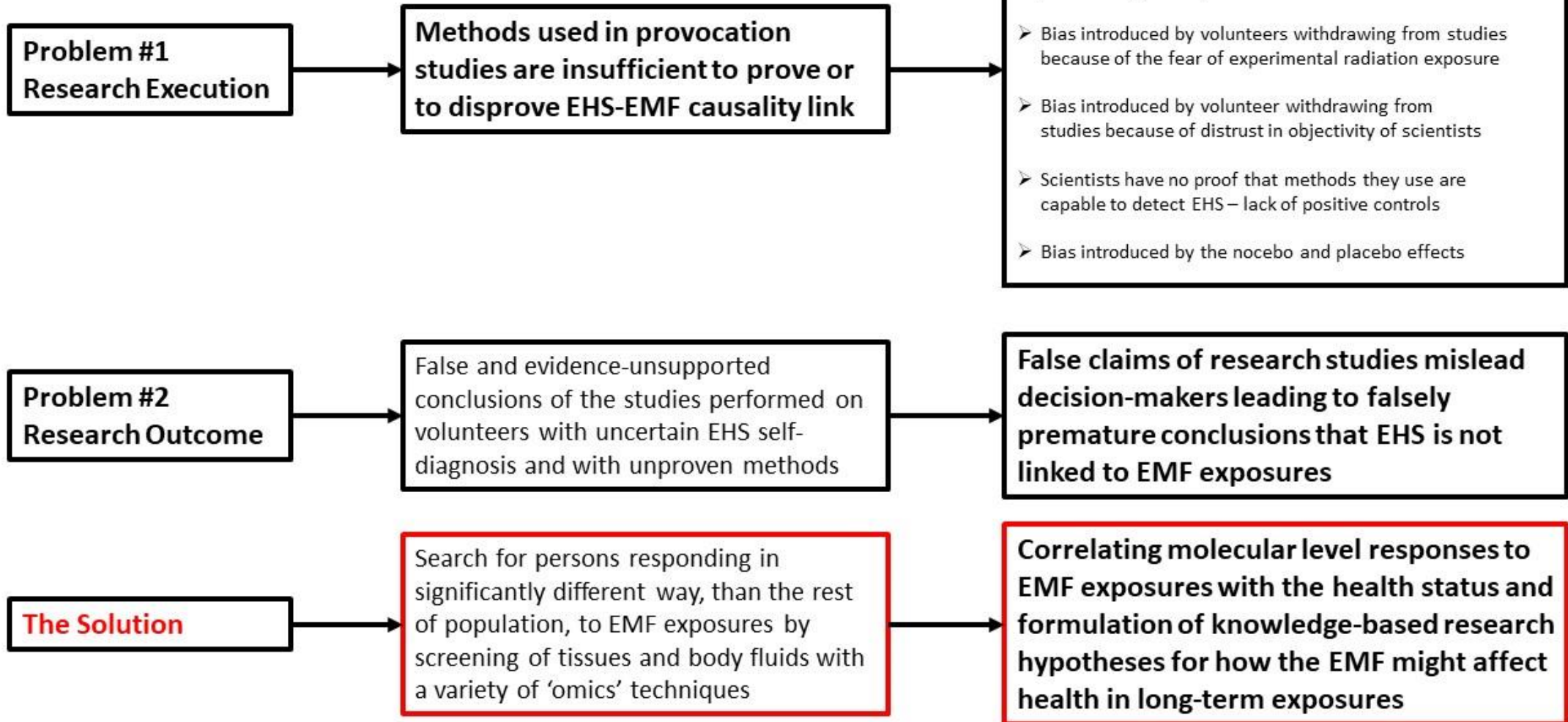
- **Scientific information is insufficient, inconclusive, or uncertain**
  - IARC classification of cell phone radiation as possible carcinogen (Group 2B) means that the science is insufficient, inconclusive, and uncertain
- **There are indications that the possible effects on human health may be potentially dangerous**
  - Four replications of epidemiological studies (Interphone, Hardell, CERENAT, Canadian Interphone) show an increased risk of brain cancer in long-term avid users – potentially dangerous effect
- **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**

1. Proposed term of the individual sensitivity to EMF includes the phenomenon of the electromagnetic hypersensitivity (EHS) but it has a much broader meaning
2. EHS exists (for explanation why see 'Brief Report on EHS' available on the BRHP blog)



# PROBLEMS of the EHS provocation studies

by Dariusz Leszczynski, February 11, 2018



## **5G "CONFUSION"**

**5G IS BEING DEVELOPED AND DEPLOYED AT  
THE SAME TIME**

**EVEN THE TECHNICAL STANDARDS DEALING  
WITH THE 5G ARE NOT ALL READY YET**



# 5G AND SKIN

- Skin is the largest organ of the human body
  - Involved in regulation of the immune response
  - Generates mediators affecting nervous system
- Lack of science on human skin response to 5G EMF
- Single study on RF-EMF (GSM) and skin proteome [Karinen et al. 2008]
- 5G technology spectrum 6 GHz – 100 GHz where above 6 GHz energy is deposited solely in the skin
- ICNIRP plans to classify skin as 'limbs'
  - Limbs are permitted to get higher exposure than the head and trunk

# RESEARCH ON 5G MILLIMETER-WAVES AND SKIN

- Performed studies on mm-waves & skin
  - Human volunteer – ca. 11 studies
  - Human in vitro – ca. 26 studies
  - Animal in vivo (rat, mice) – ca. 56 studies
  - Animal cells (rat, mice) – ca. 10 studies
- **TOTAL of ca. 103 studies**
- If the exposure is for long periods and non-thermal – we do not know how skin cells will respond to the deposited energy
- **Claims that "*we know skin will not be affected*" and claims that "*we know skin will be affected*" are premature and, based on the available scientific evidence, misleading & false**



# LIMITATIONS OF RESEARCH ON 5G MILLIMETER-WAVES

- Very limited number of studies
  - Mobile & Wireless Forum refers some 470 studies
  - EMF Portal lists some 100 technical/dosimetry studies
  - Leszczynski & Kuster refer some 100+ studies on skin and skin-related effects
  - ORSAA database lists some 100 studies
- Lack of 5G pertinent research
  - Lack of studies examining human volunteers
  - Lack of studies on individual sensitivity
  - Lack of studies on chronic, long-term, exposures
- Studies from a very limited number of research groups (!)
- Lack of replication studies confirming correctness of observations (!)
- Vast majority of studies done in animals and in vitro on cells grown in laboratory

**WE DO NOT KNOW WHAT HEALTH EFFECTS OF 5G  
MILLIMETER WAVES MIGHT BE**

**CLAIMS THAT 5G IS SAFE AND CLAIMS THAT 5G IS  
HARMFUL HAVE NO BASIS IN PUBLISHED  
RESEARCH**

**WE MAY SUSPECT THAT SOME EFFECTS WILL  
TAKE PLACE BUT...**

**RESEARCH HAS NOT BEEN DONE YET!**



# CONCLUSIONS

- **Urgent research needs**
  - Search for sensitive sub-population (biochemistry and high-throughput)
  - Study impact of co-exposures to chemicals and wireless radiation
  - Epidemiology with real wireless radiation exposure data
  - Does DNA damage happen in humans and is it relevant for cancer
  - Examining potential leakage of human blood-brain barrier
  - Study skin and skin-dependent systemic responses to 5G exposures
- **There is enough of science to implement the Precautionary Principle**
- **Especially children should be protected from all unnecessary exposures**

# LOPUKSI...

- ICNIRP, ICES, ja eri valtioiden säteilysuojeluviranomaiset, kuten STUK Suomessa tai ARPANSA Australiassa, pitävät 5G-säteilyä vaarattomana ihmisten terveydelle
- Aktivistien organisaatiot, kuten BioInitiative, EHT ja ICEMS, puolestaan katsovat, että tieteellisillä tutkimuksilla on jo täysin osoitettu 5G-säteilyn olevan vahingollista ihmisen terveydelle
- **Molemmat osapuolet liioittelevat mielipiteitään**
- Totuus 5G:n terveysvaikutuksista on vielä täysin epäselvä
- Suurin ongelma on tutkimuksen puute 5G:n millimetriaalloilla
- Emme yksinkertaisesti tiedä kuinka 5G millimetriaallot vaikuttavat ihmisen terveyteen
- **Tällä hetkellä saatavilla olevan tieteellisen näytön perusteella on täysin mahdotonta tehdä mitään johtopäätöksiä 5G-säteilyn terveysvaikutuksista väestötasolla**
- Keskustelun vastakkaiset osapuolet ovat väitteissään väärässä, kumpikin suuntaansa liioitellen