Cell Phone Radiation Health Risk and Precautionary Principle

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Who I am... few examples of my experience

- Two doctorates and docentship in biochemistry
- Assistant Professor at Harvard Medical School 1997-1999
- Guangbiao Professor at Zhejiang University, Hangzhou, China 2006-2009
- Visiting Professor at Swinburne University of Technology, Melbourne, Australia
- 22 years (1992-2013) at Säteilyturvakeskus
  - 2003-2007 as Head of Radiation Biology laboratory
  - 2000-2013 as Research Professor
- Testified in US Senate hearing on cell phones and health, in 2009
- Participated in IARC 2011 classification of carcinogenicity of cell phone radiation

Safety standards – who sets?

- Set by ICNIRP - International Commission on Non-Ionizing Radiation Protection
- ICNIRP's membership: by invitation only "private club"
- Membership of ICNIRP based on similarity of scientific opinions of experts
- No accountability for ICNIRP experts
- Limited scientific debate when all ICNIRP members have a similar opinion
- WHO EMF Project recommends use of ICNIRP safety standards
- WHO EMF Project was started and run by former ICNIRP Chairman

Safety standards in Finland

- ICNIRP recommends safety standards based on evaluation of science
- WHO recommends that all countries use of ICNIRP safety standards
- In Finland STM considered whether to use ICNIRP safety standards
- STM asked for expert opinion from STUK – Säteilyturvakeskus
- STUK provided expert opinion to implement in Finland ICNIRP safety standards
- STUK's expert writing opinion was ICNIRP member, co-author of safety standards

Questions:

- *Any bias possible? ICNIRP's self promotion?*
- *How objective was the opinion of STUK's ICNIRP member provided to STM?*

Safety Standards – short-comings

- Based on thermal effects of cell phone radiation
- Not accounting for other parameters of exposure
- Dosimetry based on macro-scale temperature changes
- Lack of micro-scale dosimetry
- Models do not resemble living cells and organs
- Comparisons to classical heating do NOT apply

Macro-scale dosimetry

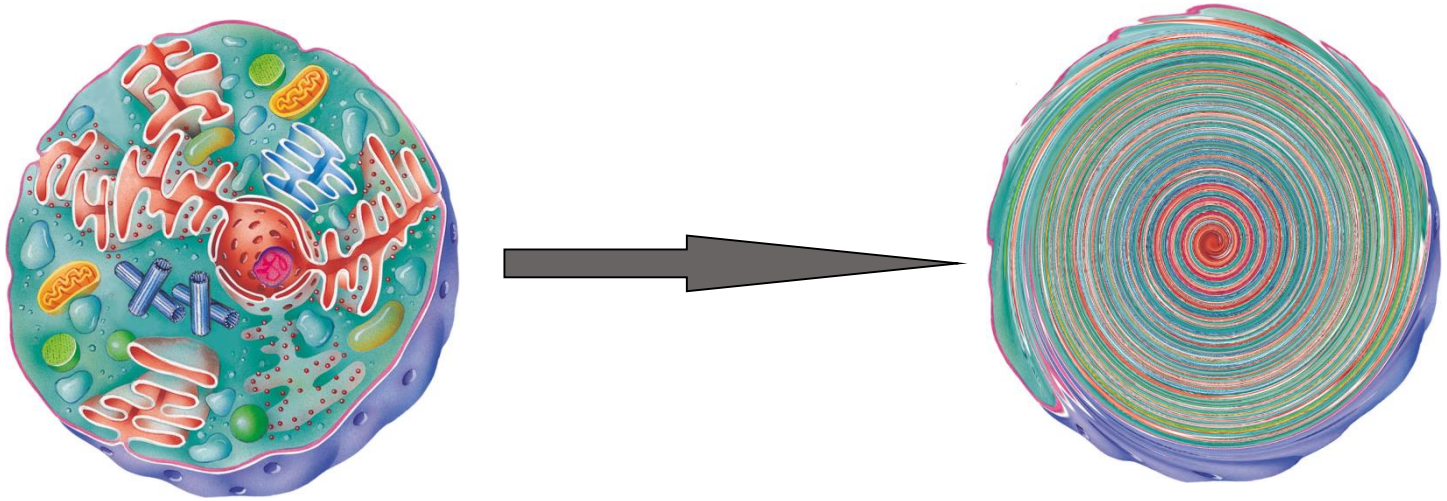
+ Water Salt Sugar =

Problem:
free movement of ions

Micro-scale dosimetry

Cell

Dosimetry ”model” of the cell



Problems associated with the safety standards

- No information whether/how cell phone radiation affects humans
- No certainty that safety standards protect all users from anything besides thermal effects
- Any equipment radiating below safety standards is considered safe which might be misleading
- Compliance with safety standards is used as an excuse to stop research funding and to deploy new wireless technologies without any testing
- Non-thermal effects exist but are refused to be studied in depth because of the “excuse” of safety standards

Reliability of the current safety standards

- ICNIRP assures that the current safety standards protect everyone
- Are the physical principles, on which are based current safety standards, sufficiently taking into consideration all pertinent properties of cell phone radiation exposures and its interactions with living matter, to assure users safety?
- The answer is no…

IARC evaluation may 2011

- 30 invited experts divided into four sub-groups
  - Dosimetry
  - Epidemiology
  - Animal studies
  - Mechanistic laboratory *in vitro* studies
- Decissions by consensus or simple majority
- Vast majority voted for possible carcinogen classification

IARC evaluation: Epidemiology

- Interphone & Hardell studies
  - no reliable exposure data
  - risk increase in long-term avid users
- Danish Cohort – no effect but no exposure data at all
- Million Women study - no effect but exposure data inadequate
- Children – only CEFALO
  - exposures for 2-4 years
  - has no statistical power to detect small risk
- Trend-data - Little et al. 2012: slow rise of brain cancer cases in USA
  - trend is similar to Interphone “prediction” but not Hardell “prediction”

IARC evaluation: Human studies

- The vast majority are “feelings” studies
  - Subjects asked how they feel
  - Subject asked do they feel when radiation is on/off
- Lack of studies examining biochemical responses of human tissues
  - Single skin proteomics study
  - Two studies examined glucose metabolism in the brain
  - That is ALL

IARC evaluation: Animal studies

- No classical toxicology possible*
  - Not possible to overdose cell phone radiation because of heating effect
  - Life-time exposures to radiation doses similar to those emitted by cell phones show no effect – result useless for human health risk estimation
- Co-carcinogen studies show some effects – cell phone radiation might potentiate effects of carcinogenic chemicals or radiation

*…but… what nobody is speaking about!

For the risk evaluation of radiation emitted by the base stations - scientific studies where exposure levels were similar to levels emitted by cell phones were like classical toxicology studies examining effects of radiation emitted by base stations

IARC evaluation: mechanistic studies

- Laboratory evidence was considered, by voting (no consensus) as insufficient to support/show mechanism of cell phone radiation effects

Individual cancer risk

(statistics from the Finnish Cancer Registry)

- **Age-adjusted rate of brain cancer for years 2005-2007**
  - Finnish men 11.2 cases/100,000
  - Finnish women 13.3 cases/100,000
- **Interphone study - 40% increase** (ca. 30min/day for 10 years)
  - Finnish men 15.7/100,000
  - Finnish women 18.6/100,000
- **The Hardell study - 170% increase**
  - Finnish men - 30.2/100,000
  - Finnish women - 35.9/100,000
- **The individual risk remains low = a rare disease**

Scale of the potential problem

- Even if individual risk will be small, considering that there are over 5 billion of cell phone users, the burden for the society might be sizable in monetary and human suffering terms

Invoking the Precautionary Principle

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 2.2.2000
COM(2000) 1 final

"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."

Invoking the Precautionary Principle

- Scientific information is insufficient, inconclusive, or uncertain
  - IARC classification as possible carcinogen (2B category)
- There are indications that the possible effects on human health may be potentially dangerous
  - epidemiological studies from Interphone group and from Hardell group show increased brain cancer risk in long-term avid users
- Inconsistent with the chosen level of protection
  - epidemiological studies showing increased risk in long-term avid users were generated based on the use of regular cell phones meeting current safety standards = current safety standards are be insufficient to protect users

Where from to get more information?

- In Finland, the role of public informant is reserved for the STUK - Radiation and Nuclear Safety Authority
- However, according to conclusions of recent review by Anu-Liisa Rönkä, *Tiedon varmuuttaminen viranomaisviestinnässä Tapaustutkimus matkapuhelinsäteilystä*, STUK is skewing debate by providing single-sided information to the public what misrepresents the current state of the science
- The message coming out from STUK is that
  - there are no proven health effects of cell phone radiation
  - health effects are unlikely to be found in the future
  - any potential risks are taken care of by the current safety standards
- According to STUK there is no problem whatsoever…

From the conclusions of review by Rönkä

"*...STUK yleisöviestinnässään vakuuttaa kansalaisille matkapuhelimien ja niiden tukiasemien säteilyn olevan terveyden kannalta vaaratonta. STUK esittää kantaansa käyttäen sellaisia argumentoinnin keinoja, jotka antavat vaikutelman todellisuuden objektiivisesta kuvauksesta ja lähes huomaamatta varmuuttavat puhujan positiota ja epävarmuuttavat vastapositiota. Tarvitaan monta tutkimuksellista lähilukukertaa kaivamaan esiin puheen faktuaalistamisen konstruktiivisuus ja implisiittinen vastapuhe. STUK itse ei kerro lainkaan siitä, miten laajasti matkapuhelimien ja niiden tukiasemien säteilyn terveysriskeistä kiistellään asiantuntijoiden keskuudessa. STUKin yleisöviestintää lukiessa vastapositiota heikennetään niin, että kysymys matkapuhelimien ja niiden tukiasemien säteilyn aiheuttamista mahdollisista terveyshaitoista marginalisoituu yleisön kannalta merkityksettömäksi, teoreettiseksi tutkimuskysymykseksi...*".

Conclusions

- IARC classification of the 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 sufficiently supported by the scientific evidence
- Users should be 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)
- Children, who will have long time of usage, should be encouraged to limit exposures
- Research should continue to find out how human body reacts to cell phone radiation
- Current safety standards should be urgently revised to better reflect the available science
- Information provided by STUK should be looked at with caution as they currently skew presented evidence towards the no-effect at all