The Need for a Precautionary Approach with Regard to Both Cellphones and their Base Stations*

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Environmental Levels of EMF

"Electromagnetic fields occur in nature, however, man-made fields are generally much larger. Environmental exposure to man-made EMF has steadily increased throughout this century and public awareness of the possible risks from exposure to man-made EMF has been mounting."

Philip Chadwick and Zenon Sienkiewicz
WHO Draft Document Electromagnetic Fields 1998

"There is evidence of a ten-fold increase in radiofrequency radiation in Western cities and towns over the past 20 years with the profile changing from mainly UHF and VHF to mainly cellphone microwave radiation."

Yngve Hamnerius and Thomas Uddmar
Microwave exposure from mobile phones and base stations. Presented at Mobitel conference on Cellphones, Gothenburg, September 1999. In press.

Scientific Evidence of Non-thermal, Biological Effects

The published peer-reviewed literature base describes a wide range of biological effects in animal models and human cells in vitro at low, so-called non-thermal, levels of intensity.

Various biological effects have been reported at SAR below 0.08 W/kg or power densities (depending on the frequency) of 2-10 W/m^2.

These include effects on:

- Cell proliferation
- Behaviour
- Sleep patterns
- Blood brain permeability
- Calcium ion efflux and cell membrane transport generally
- Accumulation of heat shock proteins
- Level of an Enzyme: Ornithine Decarboxylase
- Level of hormone: Melatonin

Specific published studies showing biological effects at non-thermal levels are summarised and assessed in the context of the overall numbers of studies conducted at these low intensities. The controversy over what the vast research literature suggests on the effects of RFR generally is examined on the basis of who funds the research.

*) Original paper

Review of Evidence on Non-thermal Effects

Debate within the Scientific Community

- Vienna Symposium in October 1998.
- Royal Society of Canada Review of the Potential Health Risks of Radiofrequency Fields from Wireless Telecommunication Devices, March 1999 (see cover).

Epidemiological Evidence

- Too early to answer the question on ill health in humans using epidemiological techniques.
- Not surprising therefore that these have not shown any effects.
- Lack of such evidence does not equate with evidence of no effect.
- No one knows what are the long-term effects of this technology and whether they are cumulative.

Why is the Evidence of Non-thermal, Biological Effects not Considered Relevant by the Advisory Bodies?

- Does not directly relate to illness in humans.
- Not replicated.
- Uncertainty regarding their significance.
- Lack of explanation of the mechanism for the wide range of observed effects.

Circumstantial Evidence Suggesting Why Scientific Evidence might be Disregarded

- Multi-billion pound industry promoting a highly desirable product (22,000 masts with 100,000 expected; 24m cell phones in use; heavily promoted including targeting of children using Disney®).
- Whole hearted support from central government. UK P.M.'s demand for 100% e-commerce coverage.
- Contentious issues surrounding the selection, prioritisation, organisation, funding and publication of research in this field.
- Lack of openness and full divulgence of facts regarding emissions from cellphones themselves.

Research Base – is the Playing Field Level?

Evidence to the HoCS&T Committee:

- Only £100,000 expended by DoH on cellphone research
- >95% of this is spent on rat memory research and <3% on human behavioural work
- EU 5th Framework Research Programme – industry retains the power of vetoe over choice of laboratories as it is funding 50% of the programme.
- World wide, >80% of all research on the health implications is funded by the industry.

Described in Microwave News – New York publication

- Allegations of : funding of studies unlikely to show findings (Roti Roti & Malyapa), interference with the writing up of the discussion and conclusion section of research papers (H. Lai); suppression of research findings (H. Lai, R. Adey, G. Carlo).

Could the net result of the above be a negative publication bias? Examples from the nuclear reprocessing industry and from the debate on genetically modified food are used to demonstrate the existence of negative publication bias.

'Post-marketing Surveillance'

- Wireless Technology Research equates 'post-marketing surveillance' with rigorous 'protection of the public health'.
- surveillance of cancer statistics, mortality rates etc. post-exposure, no matter how complete, should not be confused with effective health protective measures.
- health protection would include advising the consumer to keep cellphone calls short and implementing measures to minimise the levels of radiation around the masts.
- difficulty of attributing future clusters of cancer to masts

Comparing Standards for General Public RF Exposure Levels

(900 and 1800 MHz are the two main existing UK mobile phone bands)

General Public Levels	Frequency MHz	E field V/m	Power W/m^2	Power $\mu W/cm^2$
NRPB, 1993	900	112	33	3300
(Current UK Investigation Levels)	1800	194	100	10000
FCC OET65:1997-01 (USA)	900	47	6	600
Based on ANSI/IEEE C95.1-1992	1800	61	10	1000
Canadian Safety Code 6 (SC6) 1993	900	47	6	600
	1800	61	10	1000
ICNIRP, 1998 (recognised by WHO)	900	41	4.5	450
CENELEC, 1995 (EU)	1800	58	9	900
Australia 1988 (under review)	900 / 1800	27	2	200
Two USA research bases(1995)	30 - 100000	19	1	100
Poland (non-stationary people)	300 - 300000	19	1	100
(stationary people)		6	0.1	10
Russia, 1988 (general public)	300 - 300000	6	0.1	10
Italy, Decree 381 (1999)	30 - 30000	6	0.1	10
Toronto Health Board	900	5	0.06	6
2000, proposal based on SC6/100	1800	6	0.1	10
Swiss Ordinance ORNI (for base	900	4	not	not
Stations) From 1st.Feb. 2000	1800	6	specified	specified
EU & UK EMC Regulations equipment Suscept test level (domestic & comm.)	30 - 2000	3 any signal	not specified	not specified
Typical max in public areas near base station masts (can be much higher)	900 & 1800	2	0.01	1
Dr Cherry (NZ) proposal for now	300 - 300000	0.15	0.0005	0.05
aiming for a level by 2010		0.06	0.0001	0.01
Average US (EPA 1980)----->	approx	<0.13	<0.00005	<0.005
City Dweller max (FCC 1999)----->	30 - 300000	<2	<0.01	<1
Broadband 'natural' background	300 - 3000	<0.00003	< 0.00000001	<0.000001
** Typical, close to handset antenna	900 & 1800	50 - 300	2 – 50	200 - 5000

Prepared by Alasdair Philips, Technical Director, Powerwatch, February 2000

Large Variation in Safety Standards

- wide variation in public exposure levels for RF/microwave radiation throughout the Western World
- NRPB standard at the least stringent position (allowing the highest radiation levels) in the league table (see table above).
- HoC Scientific Advisory Committee and Scottish Parliament Transport and Enviroment Committee recently advised that the NRPB adopt a five fold more stringent level by coming into line with the standard currently advised by ICNIRP.
- according to those scientists concerned about non-thermal levels of microwave radiation this tightening of standards is inadequate to prevent biological effects.

The Uncertainty Factor

- calls for urgent reviews of literature or new research
- these include those by the Department of Health in England, the NRPB, the WHO in Europe, the European Commission, NIEHS in the USA and now the Scottish Parliament ?the IEGMP
- Australia, Canada, Japan and several European countries have recently diverted government monies into research on the safety of both cellphones and their transmitter masts.
- the British Medical Association stressed the need to encourage further research in their evidence to the HoC Scientific Advisory Select Committee in June and stated that 'we need to consider effects below the thermal threshold levels' and that 'while scientific evidence remains inconclusive we should take precautionary measures to minimise exposure and encourage further research'.

Justification for a Precautionary Approach

- **Maastricht Treaty (EU)** advocates a precautionary approach on environmental matters in Article 130r: 'preventive action should be taken, environmental damage should as a priority be rectified at source and the polluter should pay.'
- **United Nations Conference on Environment and Development** held at Rio de Janeiro in 1992 adopted the precautionary principle: 'measures should be taken where a negative impact on health or the environment is suspected, even where there is no actual proof.'
- **Italian Law** - Decree 381 enshrines the precautionary principle by requiring public exposure levels that recognise non-thermal effects of low intensity microwave radiation (6 V/m or 0.1 W/m^2).
- **Swiss Law**. Swiss Agency for the Environment, Forests and Landscapes (BUWAL) had proposed standards in a draft ordinance which was passed in 1999. This imposes a minimum distance from sensitive areas where people spend long periods of time by reducing RFR to 100 times lower than the ICNIRP levels, making them the most strict in the world (4 and 6 V/m at 900 and 1800 MHz, respectively).
- **Toronto's Department of Public Health and its Board of Health** - advocating a precautionary approach recognising the possible effects of non-thermal levels and their proposals have been submitted to Health Canada (5 and 6 V/m).
- **Sweden's National Environmental Health Action Plan** states that the precautionary principle should be applied to environmental health activities, BSE and freon emission cited as examples.
- **Salzburg, Austria, Government Department of Public Health** planning a precautionary approach (International Conference – Salzburg – 6/2000).
- **Parental concerns.**

- **Industry efforts to progressively lower the levels** of radiation emitted by cellphones – 'less must be better'.
- **Basic axiom**: If environmental exposure to microwave/ radiofrequency radiation can be minimised it should be minimised if at all possible.

Arguments Against a Precautionary Approach

- The evidence doesn't justify further restrictions either on cellphone use or manufacture or on placement of masts.
- Measured levels of RF/MW are so low that you don't need a precautionary approach. "You can place them anywhere".

Counter Arguments:

- Inadequate sensitivity of the measuring equipment (see WHO Report).
- No known safe level. Although measured levels are indeed very low, we don't know if these are safe when human populations are exposed 24 hours a day for years.
- Although very low compared to NRPB public exposure level, these levels are not necessarily completely benign (false sense of security when comparing levels to those designed to prevent thermal effects).
- Non-static nature of these levels (increasing numbers of users, calls, radiosignal duration and complexity, addition of TETRA, etc.) implies on-going monitoring required for most sites as levels may rise and become hazardous.
- Low measurements do not rule out the possibility of much higher levels in isolated situations.
- Lack of standardised monitoring/surveillance.

The Role of Public Health Agencies

- Interpretation of available medical and scientific evidence.
- Open encouragement of, and involvement, in scientific debate.
- Advocates of precaution in the interests of protecting the public health, when in doubt.

"Waiting for confirmation of adverse effects from epidemiological studies before taking action does not adhere to a public health approach which encourages prevention over cure."

Toronto Public Health. Health Concerns of Radiofrequency Fields near base telephone transmission towers. Toronto: City of Toronto, November 1999.

History Should Teach us That We Need to be More Careful

Important analogies with:

1) The tobacco story.
2) Asbestos in the shipbuilding and construction industries
3) BSE

A MORE PRECAUTIONARY APPROACH BASED ON COMMON SENSE WOULD HAVE SAVED LIVES IN THESE THREE EPIDEMICS.

The Ubiquitous Use of Cellphone Technology has all the Hallmarks of a Future Public Health Problem (CF Cigarette Smoking)

- biological evidence suggests this form of radiation is not inert at very low intensities.
- technology has been released for use by the general population without the kinds of experiments that would enable scientists to confirm that it is entirely safe in the long-term.
- the technology is rapidly expanding, both qualitatively and quantitatively.
- as prices come down the cellphone becomes accessible to everyone including children.
- no official health warning accompanying the cellphone so people are using them for long periods.
- although most people have a choice when it comes to deciding whether to use a cellphone (where the relative risk of symptoms or ill health if any would be higher), people have no choice when it comes to passive exposure from masts (where the risk if any would be much lower). CF Active and passive smoking.
- large numbers of people will be exposed, voluntarily or unwittingly and even if the effects are subtle and affect only a small percentage of people this may have major effects on substantial numbers of people with all the consequences in terms of human suffering, health care costs and litigation.
- authoritative bodies and individuals are adamantly insisting there is absolutely 'no risk to the public health'.

Conclusions

- Evidence of non-thermal biological effects is accepted by eminent groups of scientists.
- Recent calls for further research to confirm the significance of non-thermal effects amount to an additional justification for adopting a cautious approach.
- Any new technology is likely to have some effects even if they are very small. Society needs to know about these risks and make an informed judgement about whether it wants to accept them or accept the costs of minimising any risk.
- The principle of minimising preventable environmental exposure should be applied to EMF as much as it is to water, air, noise and light pollution.
- The legitimate concerns of parents should be seriously considered and not diminished by either scientific zealotry or the vested interests of the industry.
- Finally, the cellphone is not an indispensable necessity of life, to be promoted and distributed to every member of the public, at all costs.