Mobile Phone Hazards

A narrative on the current Discourse & The Way forward ....

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Outline

• Hazards
• Reports & Policies
• The unknown
• The Way Forward ......
Hazards of EM radiation

- Radiation absorption
- Thermal effects
- Non-thermal effects
  - * Blood-brain barrier effects
  - * Electromagnetic hypersensitivity
  - * Genotoxic effects
  - * Carcinogenic effects
  - * Sleep and EEG effects
Discovering newer ways of dying!

Answering a call from Lord Yama ..?
Genotoxic effects

In 1995, in the journal Bioelectromagnetics, Wengong Lai and Mohinder Singh reported damaged DNA after two hours of microwave radiation at levels deemed safe according to government standards.[19]
Genotoxic effects

Later, in December 2004, a pan-European study named REFLEX (Risk Evaluation of Potential Environmental Hazards from Low Energy Electromagnetic Field (EMF) Exposure Using Sensitive in vitro Methods), involving 12 collaborating laboratories in several countries showed some compelling evidence of DNA damage of cells in in-vitro cultures, when exposed between 0.3 to 2 watts/kg, whole-sample average.
EM Radiation Hazard sources

• Mobile phones
• Wi-Fi & W-LAN networks
• Cordless phones
• Mobile Data cards
• Base Stations
• Bluetooth and other μ-wave devices
Likely Affected

- Consumers
- Non-users (passive affected)
- Workers (Occupational Hazards)
Safety Guidelines
The exposure guidelines for mobile devices employ a unit of measurement known as the Specific Absorption Rate or SAR.

ICNIRP has advised that this should not exceed 2 W kg\(^{-1}\) (watts per kilogram) when averaged over any 10 gram of contiguous tissue and over any 6 minute period in the head.
Challenging ICNIRP guidelines!
SAR : FCC standards

• Requirements for exposure to radio waves established by the Federal Communications Commission (USA) and Industry Canada. These requirements set a SAR limit of 1.6 W/kg averaged over one gram of tissue.

• The highest SAR value reported under this standard during product certification for use at the ear is 1.12 W/kg and when properly worn on the body is 0.81 W/kg.
The catch

The actual SAR level of an operating device can be below the maximum value because the device is designed to use only the power required to reach the network. That amount changes depending on a number of factors such as how close you are to a network base station. The highest SAR value under the ICNIRP guidelines for use of the device at the ear is 0.57 W/kg.

What about multiple sources of EMR?
WHO statements
WHO 2009

- Cancer: Current scientific evidence indicates that exposure to RF fields, such as those emitted by mobile phones and their base stations, is unlikely to induce or promote cancers. At the moment, it is impossible to state that exposure to RF or microwave radiation (even below the permitted levels) does not have adverse effects on the health of the general population. The current evidence, however, does suggest that if there is a risk, it is small.
Therefore, a precautionary approach (as recommended by the EU (21)) to the use of this communication technology should be adopted until more scientific evidence on effects on health becomes available.
WHO 2005

• Traffic accidents: Research has clearly shown an increased risk of traffic accidents, some 3-4 times greater chance of an accident, when mobile phones (either handheld or with a "hands-free" kit) are used while driving.
WHO 2005

• Electromagnetic interference: When mobile phones are used close to some medical devices (including pacemakers, implantable defibrillators, and certain hearing aids) there is the possibility of causing interference with their operation. There is also the potential of interference between mobile phones signals and aircraft electronics.
WHO 2005

- Other health effects: Scientists have reported other health effects of using mobile phones including changes in brain activity, reaction times, and sleep patterns. These effects are minor and have no apparent health
Government led initiatives across the World
International regulations

- ICNIRP guidelines
- EC directives on EM radiation
- FCC directives
- UK Health Protection Authority directives
- Other developed world regulations
French Court Ruling

• In February 2009 the telecom company Bouygues Telecom was ordered to take down a mobile phone mast due to uncertainty about its effect on health. Residents in the commune Charbonnières in the Rhône department had sued the company claiming adverse health effects from the radiation emitted by the 19 meter tall antenna.[63]
French Court Ruling

• The milestone ruling by the Versailles Court of Appeal reversed the burden of proof which is usual in such cases by emphasizing the extreme divergence between different countries in assessing safe limits for such radiation.
The court stated that, "Considering that, while the reality of the risk remains hypothetical, it becomes clear from reading the contributions and scientific publications produced in debate and the divergent legislative positions taken in various countries, that uncertainty over the harmlessness of exposure to the waves emitted by relay antennas persists and can be considered serious and reasonable".[64]
Limiting Unknown Risks
ICNIRP : Ambiguity

• Question: It is not clear how the EMF guidelines should be applied to exposure of the fetus, especially when the mother is at work. Would the mother be subject to the general public exposure guidelines, and in certain cases, have to cease work during pregnancy as a result?
ICNIRP guidelines

• Answer: ICNIRP recognizes that exposure of the fetus and pregnant mother may require evaluation on a case-by-case basis. Exposure of the fetus and pregnant mother is an issue that should be dealt with on the basis of either national policy or administrative rules established by individual employers.
Prevention is better than cure

- Have lengthy phone conversations on a conventional telephone (landline) instead of your cell phone.
- Change to a cell phone that has its antenna outside the vehicle.
- Use a headset and place the phone away from your body.
- Find out how much SAR energy your cell phone gives off.

(Source: Medline+ - NIH, US Govt.)
EMI on Pacemakers (USFDA)

- Cell phones would not seem to pose a significant health problem for the vast majority of pacemaker wearers. Still, people with pacemakers may want to take some simple precautions to be sure that their cell phones don't cause a problem.

- Hold the phone to the ear opposite the side of the body where the pacemaker is implanted to add some extra distance between the pacemaker and the phones.
EMI on pacemakers (USFDA)

- Avoid placing a turned-on phone next to the pacemaker implant (e.g. don’t carry the phone in a shirt or jacket pocket directly over the pacemaker)
The Venice Resolution June 6, 2008.
Initiated by the International Commission for Electromagnetic Safety,

- The non-ionizing radiation protection standards recommended by international standards organizations, and supported by the World Health Organization, are inadequate. Existing guidelines are based on results from acute exposure studies and only thermal effects are considered. A world wide application of the Precautionary Principle is required. In addition, new standards should be developed to take various physiological conditions into consideration, e.g., pregnancy, newborns, children, and elderly people.
The Venice Resolution June 6, 2008.
Initiated by the International Commission for Electromagnetic Safety,

• We take exception to the claim of the wireless communication industry that there is no credible scientific evidence to conclude there a risk. Recent epidemiological evidence is stronger than before, which is a further reason to justify precautions be taken to lower exposure standards in accordance with the Precautionary Principle.
The Venice Resolution June 6, 2008.
Initiated by the International Commission for Electromagnetic Safety,

- We recognize the growing public health problem known as electrohypersensitivity; that this adverse health condition can be quite disabling; and, that this condition requires further urgent investigation and recognition.
The Venice Resolution June 6, 2008.
Initiated by the International Commission for Electromagnetic Safety,

• We strongly advise limited use of cell phones, and other similar devices, by young children and teenagers, and we call upon governments to apply the Precautionary Principle as an interim measure while more biologically relevant standards are developed to protect against, not only the absorption of electromagnetic energy by the head, but also adverse effects of the signals on biochemistry, physiology and electrical biorhythms.
ICEMS resolution

• Antennas, mobile phone masts and other electromagnetic emitting devices should be set within a specific distance from schools and health institutions, according to a report adopted by the European Parliament. The Commission should make more reliable information available about the effects of exposure to electromagnetic fields to citizens who feel that they are not well informed.
We conclude therefore that it is not possible at present to say that exposure to RF radiation, even at levels below national guidelines, is totally without potential adverse health effects, and that the gaps in knowledge are sufficient to justify a precautionary approach. In the light of the above considerations we recommend that a precautionary approach to the use of mobile phone technologies be adopted until much more detailed and scientifically robust information on any health effects becomes available.
If there are currently unrecognised adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system, the greater absorption of energy in the tissues of the head (paragraph 4.37), and a longer lifetime of exposure. In line with our precautionary approach, at this time, we believe that the widespread use of mobile phones by children for non-essential calls should be discouraged.
• We also recommend that the mobile phone industry should refrain from promoting the use of mobile phones by children
Way ahead
Needed

• Government sets in place a national system which enables independent testing of shielding devices and hands-free kits to be carried out, and which enables clear information to be given about the effectiveness of such devices.

• Need for a national regulator for protection, research and testing for EM Radiation & EM devices

• Media campaign on need to guarded and careful use of mobile phones
needed

- Research programme should operate under the aegis of a demonstrably independent panel. This programme be financed by the mobile phone companies and the public sector (industry departments, health departments and the research councils), possibly on a 50:50 basis.

- State and National guidelines on permissions for New base stations and regulate existing base stations with designated National and State authority for monitoring/regulating EMR
In line with our precautionary approach, at this time, widespread use of mobile phones by children for non-essential calls should be discouraged. Mobile phone industry should refrain from promoting the use of mobile phones by children.

Operators actively pursue a policy of mast sharing and roaming where practicable to reduce EMR. TRAI may bring out a policy directive in this regard.
Needed

- International standard for the assessment of SAR values from mobile phones should be adopted for use. Information on the SAR values for mobile phones must be readily accessible to consumers at the point of sale with information on the box, on leaflets available in stores giving comparative information on different phones and with explanatory information, as a menu option on the screen of the phone and as a label on the phone, on a national web site, which lists the SAR values of different phone types.
Needed

- Periodic monitoring and publication by State and National designated agencies of
  - SAR of devices,
  - Power density levels of EMR in public places
  - Violation and violators of standards
- Awareness creation amongst consumers on 5Rs – Principles of sustainable consumption
  - Refuse mobile phones (atleast a second phone)
  - Reduce (Switch off when you reach home or office ...)
Fear is the father of courage and the mother of safety. ~ Henry H. Tweedy

Nothing in life is to be feared. It is only to be understood. ~ Marie Curie

Thanks