

# REPORT from the AOCR-5

5th Asian and Oceanic IRPA Regional Congress on Radiation Protection (AOCR-5)  
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prepared by  
**Dariusz Leszczynski, PhD, DSc**

***Adjunct Professor of Biochemistry***  
Division of Biochemistry and Biotechnology  
University of Helsinki, Finland  
***Chief Editor of 'Radiation and Health'***  
Specialty of the 'Frontiers in Public Health'  
Lausanne, Switzerland

## CONTENTS OF THE REPORT

- IRPA Associate Societies Forum – NIR at IRPA? -page 2
- Refresher course on EMF safety limits and health -page 3
- Session 6.4 - 5G / Non-Ionizing Radiation -page 4
- Session 7.4 - Non-Ionizing Radiation (1) -page 7
- Session 8.4 - Non-Ionizing Radiation (2) -page 9
- DL Closing Words... -page 12

The AOCRP-5 Congress' predecessors, the Asian and Oceanic Association for Radiation Protection Congresses, were held in Seoul (2002), Beijing (2006), Tokyo (2010) and Kuala Lumpur (2014). The fifth congress of the series, the AOCRP-5 - Congress of the Australasian Radiation Protection Society, was held in May 2018 in Melbourne, Australia. The AOCRP-5 was also the IRPA - International Radiation Protection Association Regional Meeting for 2018 in the Asia-Pacific Region.

A sizable part of the AOCRP-5 program was devoted to the non-ionizing radiation emitted by the wireless devices.

## IRPA Associate Societies Forum – NIR at IRPA?

On **Monday, May 21, 2018**, was held '**IRPA Associate Societies Forum**', chaired by Roger Coates, IRPA President and Bernard le Guen, IRPA Executive Officer. On the agenda of this even was one interesting agenda item #7. The general thoughts of IRPA on possible NIR engagement are illustrated in the photo of the slide from the presentation, shown below:

### AGENDA

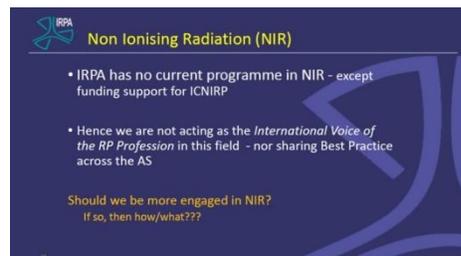
1. Welcome by the President of IRPA, the IRPA Executive Officer, and the Chair of AOARP
2. Brief introduction by the Associate Societies (AS) present
3. An Overview of IRPA Activities: Strategy and the key activities
4. System of Protection Consultation – overview and 'what next'
5. Regional Representation consultation
6. Horizon Scanning – issues on our 'Watch List'

Opportunity for AS [associate societies] input of areas of concern

### **7. Non Ionising Radiation – what should IRPA be doing?**

8. IRPA Young Persons Network
9. Issues from the Associate Societies
10. Host

In the discussion of the agenda item #7, the Associate Societies of the IRPA were asked whether IRPA, that has no activity in the non-ionizing radiation, should establish its presence in this important science and regulatory arena. This action, if taken, would be justified by the extensive knowledge of IRPA membership in the all aspect of non-ionizing radiation. It remains to be seen what will be the opinions of the Associate Societies and whether, in the end, IRPA will step into non-ionizing radiation arena.



## Refresher course on EMF safety limits and health

On early Tuesday morning, May 22, 2018, was held a refresher course ‘**Overview of the radiofrequency health science and its relation to international guidelines**’. The speaker was Rick Tinker of ARPANSA - Australian Radiation Protection and Nuclear Safety Agency.

In the first program of the AOCRP-5 this refresher course was announced with the speaker Rodney Croft of Wollongong University and ICNIRP. Unfortunately, the speaker assignment was changed. It was a pity because Rodney Croft is the person leading the ICNIRP revision of the safety recommendations for the wireless radiation, including the 5G.

### ‘Overview of the radiofrequency health science and its relation to international guidelines’ - Course Summary

Radiofrequency (RF) electromagnetic fields (EMF) are used to enable a number of wireless technologies, ranging from FM and emergency radio, to mobile telecommunications and Wi-Fi. Given the ubiquity of such technologies and the resultant EMF exposure to humans, it is important to understand the effect of RF exposure on human health. This presentation will provide a brief overview of: 1/ the RF EMF health science; and 2/ the EMF guidelines developed by the International Commission on Non-Ionising Radiation Protection (ICNIRP) to provide guidance on the safe use of RF EMF.

Few interesting points from Rick Tinker’s presentation

- Early on, ARPANSA had a program to evaluate scientific evidence on the biological and health effects of the RF-EMF. Unfortunately, in spite of the already sizable effort, the program was abandoned and ARPANSA decided to follow closely recommendations of the ICNIRP
- According to Rick Tinker, it is no problem that ICNIRP, organization that evaluates health effects of the non-ionizing radiation, has no single medical doctor to evaluate health-related issues
- According to Rick Tinker, as long as the science is fully and properly evaluated and in accordance with the Best Practices, there is no problem that medical doctors are completely absent from ICNIRP
- ARPANSA is preparing a detailed evaluation of the effects of RF-EMF on brain cancer and it will be published in the coming months
  - *[DL comment: Rick Tinker stated that the ARPANSA relies in its evaluation of the brain cancer risk on the “established evidence”, such as e.g. study from Simon Chapman and co-workers; it is very likely that Chapman will be in some way involved in what opinion on brain cancer and RF-EMF will be generated by ARPANSA]*
  - *[DL comment: my discussion with Simon Chapman on his epidemiological study can be viewed in this BRHP blog post and submitted comments ‘[Professor Simon Chapman responds...](#)’]*
- The value and validity of the recently published US National Toxicology Program (NTP) study of RF-EMF effects in rats and mice will be evaluated by ARPANSA after the peer-reviewed NTP study was published
- ARPANSA is, according to Rick Tinker, using the Precautionary Principle when it is advising cell phone users concerned with the health effects, to limit exposures to RF-EMF radiation by changing their calling habits (limiting call length) and by using e.g. headsets

- Persons with self-diagnosed sensitivity to electromagnetic fields (EMF) – the EHS - ARPANSA has a register of the cases. The register does not solve the problem of EHS but collects information used for the informed decisions in this matter. ARPANSA considers the to-date executed EHS provocation studies as a valid scientific evidence showing the lack of correlation between EMF exposures and EHS symptoms
  - *[DL comment: I strongly disagree with this assessment of the science on EHS and my opinion is available from this BRHP blog post [‘Open Letter on the Electromagnetic Hyper-Sensitivity Research’](#)]*
- Rick Tinker and ARPANSA very closely follow all advice coming from ICNIRP and from the WHO EMF Project and they do not see any scientific or ethical problems there
  - *[DL comment: the role and significance of the ICNIRP and the WHO EMF Project is controversial as seen from the recent investigative report in the US [‘The Nation: How Big Wireless Made Us Think That Cell Phones Are Safe: A Special Investigation’](#)]*

## Session 6.4 - 5G / Non-Ionizing Radiation

**Chair: Mike Wood**

The session was organized and sponsored by the AMTA - Australian Mobile Telecommunications Association.



Speakers:

1. **Mike Wood**, AMTA: The challenges, opportunities and setting the framework for 5G and EMF
2. **Ken Joyner**, Mobile Wireless Forum (MWF): EMF Exposure Research related to 5G Equipment
3. **Mike Wood**, AMTA: Developing Electromagnetic Field Exposure (EMF) Compliance Assessment Standards for 5G
4. **Steve Iskra**, Telstra: Electromagnetic Energy (EME) Exposure assessment of Telstra's 5G trial network on the Gold Coast, Australia
5. **Tony Paul**, AMTA: AMTA's RadioWorkSafe program – a review of the new mobile industry safety initiative for contractors and height workers

### Notes from the presentations

#### Presentation #1 by Mike Wood

It was the same presentation that he presented at the EMERG meeting on May 8, 2018. For notes from Wood's presentation see this link [‘Brief Report from the 5G session at the EMERG meeting in Australia’](#)

- Few statements from Mike Wood

- Harmonised EMF Standards - the adoption of harmonised International EMF Exposure Limits means that new efficient 5G networks can be rolled-out and EMF levels kept low while improving capacity. New EMF exposure assessment methods from the International Electrotechnical Commission (IEC) and ITU means that assessments use the most advanced methods suited to 5G. This is important to accurately assess **realistic public exposure levels**.
- Responsible Network Deployment – includes governments ensuring spectrum allocation occurs in a timely manner for 5G, and that government policy supports efficient network rollout including small cells. Network operators have a responsibility to ensure network design maximises efficiency to deliver enhanced 5G services and this also maintains **low EMF levels**. Less efficient networks use more power for the same connections.
- *DL comment: there is a continuous talk about assuring that the 5G maintains low levels of EMF exposure. However, there is not sufficient scientific research to show what low levels assure no health effects in short- and long-term exposures (acute and chronic exposures). It seems that the telecom industry assumes that their low level exposures will not cause never any health effects and telecom industry forcefully imposes this scientifically unsupported assumption on others, especially governmental decision-makers. Mentioned above “realistic public exposure levels” and “low EMF levels” have no basis in scientific research on biological effects predominantly because such research has not been done.*

## Presentation #2 by Ken Joyner

- Few statements from Ken Joyner
  - The fifth generation of mobile communication systems (5G) will to a large extent depend on the successful utilization of frequency bands above 6 GHz. The use of these higher frequency bands means new challenges in terms of electromagnetic field (EMF) exposure assessments since the fundamental exposure metrics (basic restrictions) change from SAR to power density (PD).
  - EMF exposure limits in place today from ICNIRP, IEEE and the FCC are not fully harmonized and will lead to different requirements in different markets. There is also an issue with the conservativeness of current limits, in particular, the FCC limits.
  - Under the current FCC limits, researchers have shown that **the maximum power of a 5G device might have to be reduced to less than 15dBm – 10 dB below the level of 24dBm used by current mobile phones** – which would reduce the connectivity range of devices, requiring significant additional mobile network infrastructure deployment.
  - One of the co-authors of presentation was Christer Törnevik. His 2017 conference presentation of problems in settling 5G MIMO antennas is described in the BRHP blog “[Safety limits and the deployment of the 5G MIMO towers](#)”
  - Presentation was focused on the two 5G-related (frequencies above 6 GHz) engineering, dosimetry and compliance research consortia projects that were sponsored by the MWF to identify and update the scientific rationale for the exposure limits above 6 GHz: (i) develop compliance testing procedures, (ii) develop numerical modelling and PD evaluation of 5G devices, (iii) undertake thermal modelling of near-field exposure and, (iv) investigate the correlation

between PD and temperature rise in the body to provide a robust scientific rationale for proposed changes.

- *DL comment: MWF did not sponsor any research on biological or health effects of 5G at frequencies above 6 GHz*
- *DL comment: there continues to prevail thinking that the thermal effects are the sole health endangering effects and that the low power of the 5G devices, by itself, guarantees that there will not be any health effects... however there is no scientific research to support such assumption and there seems to be little interest in performing such research*
- Some of the conclusions from the research sponsored by the MWF
  - Skin has a significant enhancement of the absorption of the radiation (up to 15 GHz) due to layered structure – the standing wave effect (this effect was also presented and described in the research that was presented in 2017 at the [conference in Jerusalem](#), Israel, and at the [BioEM2017](#) in Hangzhou, China)
  - The worst case scenario: the increase of temperature in the real skin (layered structure with underlying fatty layer) is much higher than in the homogenous modes of skin
  - The increase of temperature in the skin can be by 0.4 degrees Kelvin at the ICNIRP limit for general public of 10 W/m<sup>2</sup>

### Presentation #3 by Mike Wood

- Few statements from Mike Wood
  - As the road to 5G and the next generation of mobile technologies speeds up, the International Electrotechnical Commission (IEC) is accelerating **the development of the radio frequency safety compliance assessment standards**.
  - To ensure the IEC is ready for 5G and provides global testing standards, the IEC published the new base station EMF assessment standard IEC62232 Edition 2 in August 2017, and in October 2017, the IEC completed a new Technical Report on 5G device EMF compliance assessment procedures. The new base station assessment standard 62232 ED2 provides a globally harmonised approach and the most up to date techniques for the assessment of electromagnetic fields around radio base stations including the new 5G frequencies.
  - In October 2017, TC106 at its plenary meeting in Melbourne agreed to initiate two new project teams in collaboration with the IEEE and publish dual logo standards for 5G compliance testing. The new IEC/IEEE project teams will develop full international standards for testing 5G mm-wave devices by measurement using the new Technical Report as a base line, and the second one by computational methods.
  - The IEC will have a mix of new Standards and Technical Reports available in 2018 for the 5G test networks and early deployments, and full international standards by 2020 for the main commercial release of 5G.

#### Presentation #4 by Steve Iskra

- Few statements from Steve Iskra
  - Telstra takes health and safety very seriously and ensures that our wireless networks are designed to comply with the strict electromagnetic energy (EME) safety standards set by the Australian Radiation and Nuclear Safety Agency (ARPANSA).
  - *DL comment: this is not very precise statement. ARPANSA does not set own safety standards. ARPANSA follows exactly what ICNIRP recommends and enforces implementation of the ICNIRP safety standards in Australia.*
  - An important step in preparing for 5G is to assess the EME levels and compliance of the various base station configurations, including the new 5G MIMO (Multiple Input Multiple Output) antennas that direct the radio signal to the users and devices rather than in all directions.
  - *DL comment: there might be in some countries technical problems with placing MIMO antennas on the roofs of the buildings: [‘Safety limits and the deployment of the 5G MIMO towers’](#)*

#### Presentation #5 by Tony Paul

- Few statements from Tony Paul
  - Australia’s mobile networks use a mixture of towers, poles, buildings and other facilities to locate the base stations and antennas. Increasingly our networks also use existing buildings, facilities and **street furniture for the smaller base stations referred to as small cells**.
  - These are great solutions for providing coverage but it does mean that workers on these facilities, and adjacent facilities need to be **‘antenna aware’** and apply simple steps for **managing health and safety around transmitting antennas**.
  - Knowing where radio communications and mobile base station antennas are located and how to work safely around them is important for a range of occupations.
  - *DL comment: deployment of small cells, because of their omnipresence and diverse localizations, will unavoidably cause accidental exposures of regular people to EMF levels higher than these permitted by the safety limits. The question will be not only how to work safely around the small cells but more importantly, for the regular person, how to be in vicinity of the small cells and not overexpose to EMF*

### Session 7.4 - Non-Ionizing Radiation (1)

**Chairs: Brad Cassels & Ken Joyner**

#### Speakers

1. **Rick Tinker**, ARPANSA, International Framework for Protection against Non-ionizing Radiation Exposure
2. **Andrew Wood**, Swinburne University of Technology: Non-Ionising Radiation and Health: The New Australian Centre for Electromagnetic Bioeffects Research

3. **Dariusz Leszczynski**, University of Helsinki: Wireless Radiation and Health: The case for the Precautionary Principle
4. **Dariusz Leszczynski**, University of Helsinki: The 5G telecommunication technology-emitted millimeter-waves: Lack of research on bioeffects

#### **Presentation #1 by Rick Tinker**

- A statement by Rick Tinker
  - For ionising radiation there is a greater emphasis on optimisation of protection even at low levels of exposure, whereas for non-ionising radiation there is a greater emphasis on keeping exposures below thresholds for observed effects.

#### **Presentation #2 by Andrew Wood**

- The presentation described the ACEBR. Mobile phone subscriptions continue to increase across the world, with the electromagnetic fields (EMF) emitted by these devices, as well as by related technologies such as Wi-Fi and smart meters, now ubiquitous. This increase in use and consequent exposure to the non-ionising EMF associated with these technologies has led to concern about possible health effects that could arise from such exposure. Although there has been a considerable amount of research conducted in this domain since the introduction of these technologies, uncertainty about the possible impact on health remains. The new Australian Centre for Electromagnetic Bioeffects Research (ACEBR) is a National Health and Medical Research Council Centre of Research Excellence that commenced in April 2018, bringing together both national and international leaders in the field. The main aim of ACEBR is to generate new knowledge that leads to improved health outcomes by undertaking research addressing the most important aspects of the non-ionising EMF health debate, with a strong focus on human neurophysiology, mechanisms of interaction, neurodegenerative diseases, neurodevelopment, and exposure dosimetry. Risk perception and communication research also forms part of the Centre's aims and complements the other streams and ensures that research results will be communicated effectively and appropriately.

#### **Presentation #3 by Dariusz Leszczynski**

- Few statements from Dariusz Leszczynski
  - The Precautionary Principle (PP) has been developed to manage risks where the scientific knowledge of potential risk is incomplete. European Union's (EU) document on the PP specifies that, before discussing the implementation of the PP, the scientific evidence needs to be reviewed and the three pre-conditions need to be fulfilled.
  - The scientific evidence has been reviewed by the International Agency for Research on Cancer and the three pre-conditions of the PP are fulfilled:
  - "Scientific information is insufficient, inconclusive, or uncertain" - The IARC classification of wireless radiation (WR) as a possible carcinogen means that the scientific evidence of glioma causality is insufficient, inconclusive, and uncertain.
  - "There are indications that the possible effects on human health may be potentially dangerous" - IARC classification points out a dangerous effect - glioma.

- “Inconsistent with the chosen level of protection” - Epidemiological evidence was obtained from populations exposed to WR compliant with the safety limits = the current safety limits might be insufficient to protect users from glioma.
- The document ‘The Precautionary Principle’ from the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), confirms that PP debate can begin: “...the unquantified possibility is sufficient to trigger the consideration of the PP...”
- Debating implementation of the PP should be for the 3G and 4G WR. The future 5G WR, that will include 3G and 4G WR and will be supplemented with the new millimeter-waves emitting technologies of unknown biological effects, should also be included in this debate on the implementation of the PP.

#### **Presentation #4 by Dariusz Leszczynski**

- Few statements from Dariusz Leszczynski
  - The 5th generation (5G) of the wireless communication technology (WCT) will be soon deployed world-wide. The 5G WCT is not an entirely new technology but it will be a mix of the existing 3G and 4G WCT supplemented with the technology using radiation with frequency ranging from 6 GHz to 100 GHz – the millimeter-waves (mm-W).
  - The mm-W differ from the radiation frequencies emitted by the 3G and 4G because the mm-W radiation is deposited solely within the skin and the eyes. There are only ca. 200 research studies on biological effects of mm-W and there is a complete lack of large epidemiological and toxicology studies and the knowledge on short- and long-term impact of mm-W exposures on health.
  - The current ‘no-health-risk’ assurances from the telecoms industry, referring to the low power emissions from the 5G devices, might be insufficient. In the past, similar assurances were given concerning the 1G, 2G, 3G and 4G WTC. However, bio-medical research has shown a possibility of health risks, leading to the classification of the WTC radiation as a possible carcinogen.
  - There is an urgent need for research on mm-W that should examine in human volunteers and in animals the physiological and biochemical effects of mm-W, including the high-throughput screening of proteins and gene transcripts in skin and eyes exposed acutely and chronically to mm-W. Research should include human volunteer studies, animal toxicology studies as well as examination of the co-effects of mm-W and chemicals/radiation and effects of mm-W on the skin microbiome.

## **Session 8.4 - Non-Ionising Radiation (2)**

**Chairs: Cameron Jeffries & Simon Turner**

#### Speakers

1. **Victor Leach**, ORSAA: Why the Precautionary Principle is needed for Non-Ionising Radiation Devices

2. **Roha Tukimin**, Malaysia Nuclear Agency: Radiofrequency (RF) Radiation Safety Assessment Around Telecommunication Structure In Malaysia
3. **Andrew Wood**, Swinburne University of Technology: Effective Non-Ionizing Radiation Protection
4. **NIR Panel Discussion**
  - ✓ Rick Tinker
  - ✓ Dariusz Leszczynski
  - ✓ Roha Tukimin
  - ✓ Andrew Wood

#### **Presentation #1 by Victor Leach**

- Few statements from Victor Leach (and ORSAA)
  - There is now sufficient evidence on the actual and potential adverse health effects of radio frequency (RF) devices like mobile phones and Wi-Fi to require the application of the Precautionary Approach to the management of the health risks.
  - In 2011, the International Agency for Research on Cancer (IARC, a WHO agency) classified such radiofrequency electromagnetic fields as a possible human carcinogen.
  - The Precautionary Approach is enshrined in various pieces of Australian legislation from public health to fisheries, but is yet to be used in national approaches to radiation, though the “ALARA” principle can be considered a historical version of the Precautionary Approach.
  - The Precautionary Approach can provide a means of moving forward in the face of uncertainty, reducing the risk of possible adverse health effects and promoting research to better understand these health effects.
  - *DL comment: for more opinions from ORSAA on the need of precautions see: [‘Guest Blog from Steve Weller, Australia’](#)*

#### **Presentation #2 by Roha Tukimin**

- Few statements from Roha Tukimin
  - Radiofrequency (RF) radiation which is categorised as non-ionising radiation (NIR) application is used widely in our telecommunication network technology. There are around 40 million mobile telephones registered in Malaysia and we are among the largest user of social media in the world.
  - Besides its benefit, people are concern towards the RF radiation effects to their health which is emitted by the telecommunication structure or known as radio base station. The perceived threat of RF radiation emitted by telecommunication structure is topic which has gained attention among the public in recent years as the structure are located adjacent to residential, commercial area and within the vicinity of schools.

- Due to that concern, Malaysian Nuclear Agency has conducted safety assessment around the telecommunication structure around Malaysia since 2000 such as in Penang, Kuala Lumpur and Sarawak. The objective of the assessment are to assess the RF radiation level around the telecommunication structure and compare the RF radiation level based on the Malaysian Communications And Multimedia Commission (MCMC) Mandatory Standard and International Commission on Non-Ionising Radiation Protection (ICNIRP).

#### **Presentation #4 by Andrew Wood**

- A statement from Andrew Wood
  - Non-ionizing radiation (NIR) has been regarded as the ‘poor cousin’ of ionizing radiation, because of a perception within the radiation protection community that NIR is harmless and the risks media-generated. However, the ubiquitous nature of NIR, both from natural sources (solar UV) and from technological advances (MRI magnets, power-line fields, telecommunications) make NIR protection an area increasing numbers of managers and professionals have to deal with.

#### **NIR Panel Discussion**

- Panelists’ opinions remained unchanged during the short discussion.
- Rick Tinker strongly promoted ICNIRP and WHO EMF Project guidelines for safety limits as sufficiently conservative to protect everyone, no matter young or old, healthy or sick, using devices sparingly or avidly, being exposed for short time or for lifetime.
- Andrew Wood was in favor of the ICNIRP guidelines and considered only thermal effects as proven. However, he considered also, as a scientist, that more research is needed to obtain scientifically more robust evidence proving or dismissing the existence of the non-thermal effects. He also agreed that the research on millimeter-waves is very scares and more studies are needed. However, he considered the current science on millimeter-waves and health as sufficient to go ahead with the 5G deployment.
- Roha Tukimin spoke predominantly about the cell tower radiation emissions and was in favor of the current ICNIRP guidelines. She was of the opinion that as long as the cell towers emitted radiation levels are within the ICNIRP guidelines the population living in the vicinity of these structures has no health risk.
- Dariusz Leszczynski was in favor of consideration of the implementation of the Precautionary Principle for the 3G and 4G technologies. Debate should consider what precautionary measures that would limit exposures of the users to EMF could be easily implemented. He also noted that while the implementation of precautionary measures for the 3G and 4G technologies is possible, the situation will change dramatically with the 5G technology. Ubiquitous deployment of small cells will cause that there will be no areas, especially in urban setting, without radiation exposure. Everybody, no matter where, will be continuously, 24/7 exposed to low levels of radiation emitted by the 3G, 4G and 5G devices. In the current situation of the still existing scientific uncertainty about the health impact of the long term chronic exposures to EMF and the nearly complete lack of research on the 5G millimeter waves, the introduction of omnipresent 5G technology is a big step into unknown.

## DL Closing Words

There is an urgent need to start research studies examining effects of millimeter-waves on human health. However, there is a strong resistance from the telecom industry and from the decision-makers to start new research programs. ICNIRP and the telecoms strongly propagate the idea that the low power of EMF emissions from the 5G devices will guarantee that human health will not be affected. However, the same assurances were made in 70's when the first generation of cell phones was commercialized, followed by the unlimited spread of the 2G, 3G and 4G devices – as long as the device emits radiation within the ICNIRP guidelines it is considered as safe, what is not necessarily the case as shown by a number of research studies. As a direct consequence of the scientific research, in 2011 the International Agency for Research on Cancer has classified radiation emitted by the cell phones and cell towers as a possible human carcinogen. This classification appears to be strengthened by the new research studies on 3G and 4G-emitted EMF published after year 2011. However, what the biomedical research on millimeter-waves, performed in the future, will show is a complete enigma. However, no matter what the future research will show, the 5G technology will be by then fully deployed and without any possibility of reverse because the whole future life of the humanity will be based and dependent on the functioning of the 5G radiation-emitting devices. This is a unique situation in the history of the human kind when the whole human population will be exposed to man-made devices emitting non-ionizing radiation that was insufficiently tested before deployment. What is and what will be the responsibility of the scientists, decision-makers and industry leaders who permit deployment of insufficiently tested technology that will affect us all? The answer is simple – no responsibility... because if any health problems will show up in the future, these will most likely take tens of years of time to manifest and, by then the persons that currently enable deployment of insufficiently tested radiation-emitting 5G technology will be retired or the proverbial “six feet under”.