



INTERNATIONAL EMF PROJECT 16th International Advisory Committee
Ljubljana Exhibition and Convention Centre, Ljubljana, Slovenia,
Monday 16 and Tuesday 17 May, 2011

Rapporteur – J Arwel Barrett, TD, UK Health & Safety Executive

The Team Leader of the WHO Radiation Programme, Dr Emilie van Deventer, opened the 16th annual IAC meeting of the WHO International EMF Project. She extended a warm welcome to Ljubljana, especially to new members, before giving the floor to Dr Nina Jug, Slovenian Radiation Protection Administration.

Dr Jug said how pleased she was that so many had been able to participate in the IAC and outlined a few of the key Slovenian activities. A project started in 2004 led to a code of practice being agreed by the telecommunications company. It had also carried out a programme of loaning out personal dosimeters for a few days so that people could learn about their EMF exposures. Legislation on EMFs in living environment had been enacted in 1996 and is now being reviewed. She observed that the temperature has gone out of most of the public complaints. Much of the credit for this was probably due to the work of the people engaged in the EMF project. This project has allowed big steps to be made in this technically complex field and she was very pleased to welcome the International Advisory Committee on behalf of the Slovenian Ministry of Health.

The WHO Country Office, Slovenia is the smallest of the WHO Country offices. Its Head, Marijan Ivanuša explained that Slovenia is geographically very diverse. The Country Office works on a number of health projects over a wide range of social considerations. He extended the WHO's thanks to Dr Peter Gajsek for his extremely efficient preparation and facilitation of the meeting.

Dr van Deventer asked the delegates to nominate candidates for the position of Meeting Chair and Vice Chair. Arwel Barrett proposed Dr Simon Mann as Chairman and Lindsay Martin proposed Agnette Peralta as Vice-Chair. With no other nominations put forward the meeting agreed to their appointments and Dr Mann initiated proceedings by asking all (in excess of fifty) delegates to introduce themselves.

Adoption of the agenda

Agreed.

Minutes of the 15th IAC meeting

Minutes of 15th meeting were prepared by Martin Gledhill, NZ and were accepted.

1. Update on the International EMF Project

E van Deventer

Dr van Deventer reminded delegates that WHO is a global organisation with 147 country offices in 6 regions and its HQ in Geneva, Switzerland. WHO also has the International Agency for Research into Cancer located in Lyon, France.

The Radiation Programme covers both ionizing and non-ionizing radiation. Aspects of ionising radiation and health include natural (radon) exposures, chronic exposures from past accidents (e.g. Chernobyl), planned exposures (e.g. medical devices), and emergency preparedness and response (e.g. Fukushima). Non-ionizing topics are covered by the International EMF Project (0-300 GHz) and the ITNERSUN ultraviolet programme.

Dr van Deventer reviewed the role of the IAC and emphasized the relationships with the various partners of the Project. She stressed that the radiation projects are not funded from core WHO funds and rely totally on contributions from national Governments or institutions. Dr van Deventer expressed the gratitude of the IAC in thanking both the Slovenian and Canadian Ministries of Health for their funding to support this IAC meeting.

The work of WHO can be split into three main categories – scientific; policy and communications. On the scientific front, the EMF Project has been extremely productive and is now in its final phase. Many meetings have contributed to the WHO Scientific Reviews, which have then been consolidated into Health Risk Assessments that WHO publishes in its Environmental Health Criteria (EHC) series. IARC publishes an assessment of carcinogenicity for various agents [note: IARC published a summary report on the carcinogenicity of radiofrequency EMFs in *The Lancet*, vol. **12**, July 2011] while for EMFs, ICNIRP publishes a review of non-cancer effects. The completed work includes EHC publications on Static Fields (Nr 232, March 2006) and Extremely Low Frequency EMFs (Nr 238, June 2007). These documents made major contributions to the development of ICNIRP guidelines and underpinned “Guidelines on Limits of Exposures to Static Magnetic Fields” (*Health Physics*, April 2009, vol **96**, Nr 4) and “Guidelines for Limiting Exposures to Time-varying Electric and Magnetic Fields (1 Hz to 100 kHz)” (*Health Physics*, 2010, vol. **99**, Nr 6). The final major publication for the Project is an EHC publication on Radiofrequency EMFs, work on which is now starting.

Other science activities of the Project include Agenda for Research developed by collaboration between researchers and funding bodies. The most recently published was the RF Agenda for Research in August 2010. A questionnaire had been sent out to national authorities asking how these agenda have been used and their effectiveness, to provide WHO with feedback. For many years WHO has also overseen an international database of research activity, but this has not been updated for a while and it is proposed to cease production as others are maintaining similar collections. This will be discussed later.

Three areas of policy work have been on the programme, with the Model Legislation on EMFs now being used either explicitly or as a framework by a number of national authorities. An international database of standards has been on the Project web pages but is in need of updating. A

small working group led by France and Germany's BfS will progress this work. The consensus was that a Guide for Local Authorities relating to the siting of mobile telecommunications base stations was still needed and would be progressed by a small working group including Lindsay Martin (Australia) and Martin Gledhill (NZ).

As part of improving the communications aspect of the Project, the web pages have been updated. WHO receives a number of enquiries, many of these are from S America and India with some from Africa. The Radiation Team at WHO rely on fact sheets and other material on the web pages to provide consistent responses to enquiries. These fact sheets are also very popular with web surfers. Some of these pages are in need of updating, as they are getting old. To maintain the utility and currency of the web material regular feedback is needed. Dr van Deventer asked delegates for their views of the web site. Is it accessible? Can the answers be found? What pages need translation?

2. 15.00 Report on EMF activities from collaborating centres and international organizations

Reports from collaborating centres

BfS, Germany – Dr Rüdiger Matthes reported that research projects with various health endpoints (genotoxicity, reproduction; emotional and cognitive behaviour) and exposures from either GSM1800 or static magnetic fields had been completed, without detecting any effects. Work continues looking for genetic, developmental and cognitive effects from exposures to TETRA sources. Exposure assessments were also ongoing for TETRA and RF identification and electronic article surveillance sources.

The Centre planned a number of research projects to investigate: mechanisms for childhood leukaemia; tumour production with co-agents; GSM effects in older people; effects of RF on blood forming system; high static fields effects on neurobehaviour; new telecoms technologies and their impact on people; tissue borders in models.

Communications work on base stations had reduced, but changes to the national grid had generated more enquiries relating to ELF EMFs. While it was thought that the NIMBY effect was at work, a workshop was planned for October 2011. BfS is producing a risk communications handbook drawing on various radiation examples.

ARPANSA, Australia - Dr Lindsey Martin explained that the structure of the Agency had changed. He reported that the review of the science for the EMF Standard had been completed, but here was otherwise a lack of progress. Challenges still to be faced related to completing a cost benefit analysis (CBA) and getting approval from the national regulators.

At this point Ms Agnette Peralta took the Chair.

Health Protection Agency, UK – Dr Simon Mann outlined the scope of the Agency's work, which is much wider than just radiation. Emergency response and preparedness is an important function of the Agency. Following the change in Government, there are a lot of changes happening with the

non-Departmental bodies. HPA will cease to be an independent agency, but will move into a new grouping within the Department of Health. HPA had produced a response to the second report of the Stakeholder Advisory Group on EMFs (SAGE). One of the major concerns raised by SAGE was about “net” currents. If currents are balanced, there are no net fields. However, if this is not the case, the net currents need to be minimised, which could involve siting plant rooms and substations away from occupied areas. An overarching objective is to produce more information for the public to give them increased choice. Funding is being put in place for a feasibility study to examine occupational exposures to EMFs from Magnetic Resonance Imaging (MRI) equipment.

The HPA anatomically correct voxel model, NORMAN, has been reduced to child size and used for the WiFi study sitting with a laptop in front. Head exposures for continuous output were much less than from a mobile phone. The SAR is distributed across front of child with more to the hands (which are generally much closer to the antennas than the body). This work is reported in a paper in Health Physics.

Peter Dimbeylow has further developed these modelling techniques to create a spherical polar model. This will prove extremely useful to investigate the generation of phosphenes in the eye (an important consideration, as the retina is seen as an outlier for the brain). Cubic models were not closely applicable to solving questions relating to spherical organs.

HPA is an active participant in the MOBIKIDS (mobile phones and children) project and others to determine the fundamental properties of tissue and pregnancy related issues.

The HPA Advisory Group on Non-Ionising Radiations continues its work with completion of a report into the effects of RF as its high priority.

Dr Mann thanked Ms Peralta and took the Chair.

Reports from international organizations

International Labour Organisation – Shengli Niu reported that, following consultations, ILO dropped the proposal for RF to be added to the list of industrial diseases, as the science did not support it. This decision may be reviewed after IARC completes its carcinogenicity risk review at the end of May 2011. If a disease is listed and the worker is exposed to the agent, compensation is easier to claim. He reminded delegates that there will be an ILO Congress in Cancun, Mexico, 2012 which will include discussions on EMFs.

International Telecommunications Union – Sergio Buonomo reported that a 2010 conference resolution on human exposures instructed the ITU to collect information and develop appropriate international regulations. ITU Sectors will conduct regional seminars, workshops and other events on EMFs to help members share resources and act as focal points within the regions. ITU continues to update its recommendations and develop standards - making measurements and avoiding undesirable exposures were included.

International Commission for Non-Ionizing Radiation Protection – Dr Paolo Vecchia announced that Rick Saunders (UK) had retired and been replaced by Zenon Sienkiewicz (UK). He thanked experts for responding to the consultation document which preceded publication of the latest Low Frequency EMF guidelines (1 Hz - 100 kHz) in 2010. A paper was submitted for publication on mobile phones, brain tumours and the Interphone Study – where are we now? The Commission has a number of pieces of work in progress, which include – a Statement on THz radiation; Effects of movements in strong static magnetic fields and appointment of the Task Group to conduct the

revision of RF guidelines. ICNIRP members participated in a number of Conferences, two of which were on MRI as well as two ITU Regional Conferences in Africa and Latin America. A number of national authorities invited ICNIRP to present advice to them. The highlight of each Commission term in office is the International NIR Workshop which will next be held in Edinburgh (Scotland), 9 to 11 May 2012 in the week preceding the IRPA Congress (Glasgow). IRPA will appoint a new Commission at the Congress.

European Commission DG SANCO – Maila Hietanen presented apologies on behalf of Laurent Bontoux and spoke to his report. EC activities aim to advance scientific knowledge; build trust; and maintain a watch on policies. EMF Research projects are being funded through FP7 (eg MOBIKIDS, SEAWIND) and a further programme, FP8 is in preparation (one of the questions this will address is the links between ELF and childhood leukaemia). There are also scientific conferences in planning one of which will be in 16-17 November 2011 under auspices of SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks). SCENIHR is a valuable part of the European risk assessment process, as it provides independent evaluation of the scientific evidence. SCENIHR works hard to get a sustained engagement across the whole EU treating communications as equally important as scientific evaluation. The European Recommendation on restricting EMF exposures to members of the public (EC/519/1999) may be updated, especially after the IARC monograph on the carcinogenicity of RF is agreed. A Eurobarometer survey is trying to identify any changes in attitude since the 2006 survey. This latest study indicates a slight decrease in EMF concerns from people. However, two countries buck this trend – Spain and Italy, which both show significantly increased levels of concern.

European Commission DG EMPL – Georges Herbillon was not able to attend. WHO secretariat said that his written comments will be circulated to delegates.

Reports from NGOs and professional bodies

EHFRAN – Dr Paolo Ravazzani commented that this risk assessment network of eight European partners will finish in January 2012. Reports have been completed (RF exposures) and published through the project website and a couple are still in progress (LF EMFs).

IEC – Thomas Fischer told the meeting that ~80 national committees from the member countries make up the membership and they contribute their experts (~10000) to the standardisation work. IEC Technical Committee 201 covers the frequency range 0 – 300 GHz. An important feature of IEC publications is that they do not set exposure limits or derived reference values.

A delegate voiced concerns that this was producing a mix of standards. IEC are generic technical standards (use your own limit set) only whereas EU (CENELEC) standards link specifically to the EU Recommendation.

IEEE ICES – Dr Ralf Bodemann described the main project, which is to merge the low with high frequency recommendations into new C95.1 publication (0 to 300 GHz). The Editorial committee has prepared a mature draft for consideration in June 2011. Publication C95.1.2345, which is being developed in cooperation with NATO, will have a similar content without the informative annexes. Various standards on determining SAR from mobile phones are being finalised in cooperation with IEC to include WiFi applications. ICES launched four standards on calculation methods for SAR derivation for telecommunications devices. These are to replace measurement procedures and introduce flexibility, as different body models and postures can be used.

3. **16.30 Risk assessment activities**

Health risk assessments of EMF fields

- WHO EHC on RF – *Dr Emilie van Deventer*

Rick Saunders (UK) and Eric van Rongen (NL) have been advising on the development of the EHC publication. The WHO Task Group for the RF Environmental Health Criteria on RF will meet after the IARC conclusion report is available but publication of the monograph could be a year away. Many of the chapters could be quite similar, eg sources and exposures. Dr van Deventer raised these questions about intellectual property with Dr Bann (IARC). Access to the IARC bibliography is under discussion, as well as membership of a core group to develop the document. The intention is that the EHC will include chapters on risk assessment and protective measures.

- EC Project - Risk ASSETs – *P.Ravazzani*

This is a European Training Project. Raquel Duarte-Richardson (HPA, UK) is leading the work, which will consider legislation covering a number of topics, including REACH (chemicals) and some cosmetic consumer products. The objective is to develop training to ensure availability of highly qualified health risk assessors in Europe, who are able to assess chemicals and EMFs for consumer products, etc. The structure of the programme is quite detailed. The learning objective of the EMF Module is how to perform an EMF exposure characterisation and assessment with specific attention to vulnerable groups. The development aspects of this project are nearly completed. The Foundation course was put in place in Utrecht a few months ago.

After questions from the floor, it was understood that the intended audience is professional people who are interested in increasing their expertise in environmental health risk assessments.

Research Database

After many years of operation, there have been problems with updating the database of research projects, which has been linked with the IEEE database. WHO has a policy of not duplicating work that other organisations are doing. There are other databases around with similar functionality, such as, the FEMU Portal in Germany, ICES database and University of Ottawa. The IAC members agreed it was content for links to the other databases to appear on the WHO EMF Project page. Chiyoji Ohkubo (Japan) is now looking at making the Japanese database listings in English (as most of the papers are published in English anyway). There are many thousands of references, which are being translated into English which will make it more useful to others around the world. Ralf Bodemann is happy for ICES' database to be linked from WHO pages.

Impact of WHO EMF research agendas

C. Ohkubo

From the responses to the questionnaire addressed to MSs, it appears that the agenda were useful and provide information for deciding national priorities on research.

17.30 Risk communication activities

Ken Foster (USA) worked on the draft to reduce it in size. IAC members agreed that it should be of use, particularly in developing countries, to those with concerns for base stations. There has been some progress in the last six months but it was slow. There is still a strong need for feedback from MSs to ensure that the final publication is useful and meets WHO criteria. It was very clear that the booklet will not tell Local Authorities how to do their jobs and nor will it include extensive details of the technology being deployed. This should ensure both its acceptability and prevent it becoming outdated too quickly. The meeting discussed in broad terms many of the aspects that will be covered and in what level of detail/technical complexity for the target audience (LA professionals - not technical experts, but not members of the public). It was suggested that a few members of LA teams in developing countries would make a good test audience if they could be identified.

Factsheets

There was a discussion on the fact sheet on base stations and wireless networks and what aspects could be improved in a revision. It was generally agreed that subjects such as WiFi and similar networks were important as well as smart meters, which were proliferating at a high rate.

This was followed by a discussion on the WHO web pages and how fact sheets are presented there. There appeared to be inconsistencies as the WHO corporate page listed the five most recent, but the EMF Project pages held an archive, some of which were revisions that could lead to confusion between previous and current information. WHO rules on factsheets have changed. Factsheets must not be viewed as training material; they must be short, specific and not include recommendations.

Tuesday 17 May

Morning Session with COST Action BM0704

Joint Chairs – Emilie van Deventer & Mirjana Moser

4. 9.00 Introduction COST + WHO

Dr Alastair McKinlay gave an introduction to COST BM 0704 which started in May 2008 and is due for completion in May 2012. The action includes five Working Groups on: measurement; computational dosimetry; epidemiology; biological studies and risk management. Participants are quite a large group from the twenty seven EU MSs and many from non-EU countries. The Action also promotes short term scientific missions – these allow young scientists to get developmental experience in another institution.

5. 9.10 Review of recent research and achievements

Biological studies

Isabel Lagroye, Bordeaux

Various projects had been commissioned under the European Commission Research Programme, FP7. There had not been a call for work on static magnetic fields. The Swiss national programme had been completed and the Government was putting forward a call for proposals. In France there will be a major (2 M€) project on exposures from telecommunications systems and there is also a programme in USA studying cancer endpoints from RF exposures.

The results of a few studies using mammalian cells *in vitro* exposed to static magnetic fields could prove useful as they had the potential to be extrapolated to human exposures. Some evidence of DNA damage had been observed after exposures to fields from 300 mT to 8.5 T. There was some uncertainty about the persistence of the damage observed.

Work on possible direct effects of ELF EMFs showed no effects on DNA. There were some suggestions from other authors that there may be some therapeutic applications for fields at mT levels.

Two papers on RF and non-cancer effects showed no or negative effects and some early data on WiFi exposure gave no effects on immune systems.

A study looking for cancer effects from exposures to RF combined with chemical exposure gave no effect. In Germany, there has been a pilot study on co-exposures in mice to UMTS.

Dr Lagroye finished her summary by suggesting that more MRI studies were needed along with a need to confirm the Tillman pilot study. She also articulated a warning that decreases in available funding should not cause quality of research to suffer. To provide useful outputs, studies must sustain a high standard.

Epidemiological and human laboratory studies

Maria Feychting, Sweden

When summarising recent studies looking at associations between RF exposures and cancer endpoints, Dr Feychting said that it was a rather mixed picture. There were many inconsistent results, which may be caused by the fundamental limitations of epidemiological studies relating to diseases where many subjects cannot be interviewed directly or where recall bias may be a strong effect. Work on tumours in the head (brain, parotid gland, acoustic neuromas) showed some indications of positive associations with longer term use or use for longer (call) periods at a time, although in some studies the results were less positive when confounders had been taken into account.

Studies of brain tumour incidence showed flat or decreasing trends that may speak against a substantive effect of mobile phone use. However, Dr Feychting warned that diseases with a long latency period or that were very rare may still present a risk that is not yet visible.

Studies looking at behaviour or cognition were generally non-conclusive or showed some behavioural effects, but there may still be some confounding present. The Danish study observed children correlated to mobile phone exposure of the mother during pregnancy; saw no changes in development at 6 or 18 months and the Australian MoRPhEUS study followed adolescents, where a small change in response times was noted.

Kheifets had published a pooled analysis of ELF and childhood leukaemia studies which seemed to show a lower risk increase. Whereas for brain tumours in children, the results showed no increase in risk.

Numerical Dosimetry

Joe Wiart, France

Over 20 years the models have moved from quite simple, conservative examples to realistic phantoms used today. However, a number of models are in use – they are not all the same as some racial variations may be taken into account. An international effort (between France and Japan) is in place to develop realistic 3D foetal models. There is also work to understand the dielectric properties of foetal tissues. Now it is important that phantoms may be deformed to capture realistic exposure scenarios. This is important for developing phantoms for different stages of a pregnancy. This is increasingly important, as area and volume are square and cube functions, for a smaller body, the SAR will be higher.

6. **10.50 Research activities**

IARC evaluation and cancer classification

Joachim Schüz

Carcinogenicity classification is the end of a process which critically reviews the scientific literature followed by an evaluation of the weight of evidence. For the assessment of radiofrequency radiation, the process will start on 24th May and finish on 31st May 2011. The original researchers are members of the IARC expert group.

Preparations include the evidence of human exposure and some indication that there is a suspicion of human carcinogenicity. Working group members have a wide range of experience and other diversity factors. There should be an absence of real or apparent conflicts of interests. Critical reviews of the evidence are made by individual scientists, not as delegates from an organisation. Some invited specialists may have good knowledge, but perhaps a conflict of interest and can contribute their knowledge even though they do not take part in the evaluation. Representatives of national and international health agencies are present as observers, but not to influence the outcome. Industry observers may also be present. IARC members may participate, but not in the evaluation.

The whole process will be described in the Monographs' preamble. IARC homepage also has a link to this.

A summary will be published quickly in *The Lancet Oncology*, with the outcome being known on 31st May. The publishers require declarations of conflicts of interest that will be summarised alongside the IARC statement. There is also an opportunity for a minority opinion if they are not content with the majority view.

Discussion

Delegates raised a few questions about the quality control process and factors affecting selection of the members of the group.

Many different terms are used by different groups around the world. The definition used by WHO is that it is characterised by non-specific symptoms that individuals attribute to EMFs, ie self diagnosis.

Most studies are based upon subject provocation (usually in the laboratory) to look for acute effects and perception. This is about sensibility, not sensitivity and relates to short term acute effects.

Meta-analysis of many studies does not show any significant positive effect. No real perception was demonstrated. Results from symptom score with perceived exposure was quite significant. This is a “nocebo” effect (opposite of placebo, ie expecting harm and perceive it).

Experimental design can lead to a number of questions about the ethics of such studies using human subjects. Is it right to give false information to see if that influences perception?

The majority who claim perception are unable to demonstrate in studies. If the researchers looked for nocebo, these effects were seen. It was suggested that this was strong evidence for absence of short term effects.

One cannot draw firm conclusions about long-term effects from these data. There are low exposure contrasts in these observational studies and confounding by lifestyle may be critical.

It was asked whether this topic could be put aside. Dr Rösli agreed that, for the short term, this was probably possible, but not for long-term. What were needed were a good exposure system and a higher exposure contrast to improve the power of human laboratory studies.

7. 11.40 Emerging issues

Emerging technologies and new exposures

Georg Neubauer, Austria

Mobile telephone and similar communications products are rapidly changing with sales of various devices building, flat or declining. There are quite long lead times between development of a system, its standardisation and then presentation to the market. The trend continues to be of increasing use of data at bit rates that seem to double every 7 to 10 months.

RF ID devices for electronic article surveillance, EAS (using various frequencies: <20 kHz, 58 kHz, 8.2 MHz) and access control (120-135 kHz and 13.56 MHz and 868 MHz) along with road traffic pricing (868 MHz and 2.4 GHz) are likely to continue to proliferate. These were never really of public concern, even though the potential for significant exposures has been there for years.

RFID may cause high localised fields >10 mT close to deactivator. This is a possible concern for those with active implanted medical devices (AIMDs). The devices already carry warnings to keep credit cards away from them. Dr Neubauer could not understand why this possibility of interference from such sources was not being properly communicated to patients. For some of the deactivators, high localised limb exposures may cause possible PNS concerns under ICNIRP’s 2010 Statement on Low Frequency EMFs.

Medical applications of Wireless Body Area Networks (WBAN) may increase. These have ranges up to a few metres but most operate over a few centimetres. They may be used for monitoring personal characteristics, eg blood pressure, sugar levels, EEG, ECG linked to a communications device, eg mobile phone. These systems could be interactive with the data triggering an alert to the supervising clinician who is then able to provide a warning or advice.

Concerns about the threats to population security, especially for large gatherings or transport systems continue to drive development of improved detection devices. The THz region is still of great interest and scanners for security systems are available.

Many other technical developments could have potential for significant exposures of people. Investigations have started to look at magnetic fields in electric/hybrid cars. Inductive power transfer (IPT) could be used for recharging on the street or to provide power for trams. Large scale photovoltaic (PV) arrays could act as phased array reflectors that may interfere with aircraft avionics in the environs of airfields. Intended EM interference (IEMI) has been a concern of the military for many years. Criminals are now using such tactics to disable alarm systems and communications centres. The European Commission has included a call for research proposals on this topic under its Security programme.

This broadening of applications will only mean that exposure assessments will become even more challenging.

Emerging issues in occupational exposures

Maila Hietanen, Finland

MRI staff exposures to static magnetic fields are high and may lead to problems with hand eye coordination and balance. Distractions from experiencing a metallic taste as well as vertigo are not directly harmful but may lead to other effects. Jokela and Saunders have published a paper reviewing interactions to quasi-static fields, ie people moving in strong static fields, and propose techniques for assessing those exposures.

The draft European EMF Directive contains many levels that are different to ICNIRP guidelines. This may lead to difficulties for employers and others, causing confusion in how to apply the Directive. In next few months we should hear of the final EC solution.

Dr Hietanen gave a few examples of areas that may present problems. Emission *versus* exposure standards – most CENELEC standards are more appropriate to emission measurement, yet EMF Directive refers to these standards. Emission standards relate to antennas and in situ testing. A worker may move close and past an antenna. Window cleaners may get exposures from antennas on the outside of buildings, for short periods of time. Calculations may be used, but they are not easy to use. There are not many people out there capable of providing those calculations. There will be problems with simulating realistic exposure situations. There are many different types of dielectric welding equipment, with a wide variation in characteristics. When one is very close to the electrodes, the exposure limit value (ELV or ICNIRP basic restriction) may be exceeded, but moving a short distance away makes a big difference. How does one assess the individual's overall exposure?

How should employers manage workers at particular risk – eg those who are pregnant or with AIMD, or those workers exposed to very high field strengths? These groups could include those near induction furnaces, maybe some home hobs and in restaurants as well. RF masts will be

potentially intense sources perhaps only for short periods of time. Employers will need to consider what protection is needed, eg warning signs, but these can be quite confusing or may hinder efficient working or even be ignored. It will be difficult to refer employees to external agencies for advice, as it will be difficult for people like general medical practitioners or the implanting physicians to provide useful advice to the worker about limitations on how they should work in particular situations.

Dr Hietanen finished with a trailer for the International Congress for Occupational Health 2012 which will be held in Cancun, Mexico, which will have two sessions on radiation. ICOH is an organisation which includes a large number of occupational physicians and other health professionals who need good information on the risks from radiation.

13.30 EMF limits and standards

Basis for new ICNIRP ELF guidelines

Rüdiger Matthes, ICNIRP

The purpose and scope of ICNIRP's guidelines remain unchanged. They do not address products, measurements or interference with medical devices. The Commission bases its advice on the three reviews (IARC - carcinogenicity, WHO – health risk assessments & ICNIRP Blue Book – non-cancer risks) and more recent literature. The basic restrictions have now been expressed in internal electric field strength as this is the quantity that best relates to the adverse health effects. For PNS, the threshold is 4-6 V/m in the human body, probably in skin or sub-cutaneous tissue. Transcranial stimulation (TCS) seems to suggest a 10 V/m peak for CNS effects. This change does make it difficult to compare the new guidelines with those in the 1998 Statement.

Retinal phosphenes have a lower threshold of 5 mT at 20Hz. The retina is considered to be an outgrowth of the brain and hence a good conservative model of the brain/CNS. Weak ELF effects on neural networks appear to have a ~100 mV/m threshold at <100Hz.

EHS is not established and is not considered further.

Cancer is still the main concern although there is no evidence for adult cancer. Childhood leukaemia is the only association that has been observed, yet with no biophysical explanation for it.

Underpinning the rationale in place is that painful effects should be prevented, while remaining conservative. Phosphenes are not a permanent effect. As they are transient, it may be appropriate that workers may experience these, provided that appropriate advice and training is given.

Update on WHO Standards Database development

Shaiela Kandel

A small working group was set up in 2010 to consider how this resource could be further developed and then maintained. The intention is to improve access to existing national guidelines and encourage development by other nations where a framework is not in place. The desire is to have an interactive site, but this is quite difficult. All the detailed material will be downloadable.

The questionnaire will have various levels of detail. Basic is first level – eg is there an EMF policy, what frequencies are covered? Second level is more detailed and might include limits etc. There are also some general questions relating to matters like local policies (eg Salzburg). Numerical values may cover different frequency ranges that may make international comparisons difficult. Submissions should include both reference levels and basic restrictions. Is any averaging permitted? How is compliance assessed? If limits are more restrictive than international guidelines – why?

Discussion

In Switzerland emissions are managed to reduce immission. These specific practices will necessitate a health warning to the database informing surfers that the authoritative values will only be found on national home sites.

15:45 EMF policy issues

National updates

Israel – Stelian Gelberg described a new system in operation whereby the telecommunications network operators have installed software that provides data to the regulator.

The operator has to make at least one measurement for each base station each year. They report the results to the commissioner. Continuous monitoring is now the system looking at the outputs for each antenna provided by the operators. The regulator has to have access to operators' computers. 2006 law and 2009 regulations set up framework for restrictions and monitoring. If operators do not provide data, they do not get a licence. Every antenna has to report its output to the operators' main computer. This log (Eriksson calls it GPH) is available to the regulator. 120 approved inspectors are employed in the system looking for license violations.

The Government wants to expand the system to cover all networks, including 1G and 2G. They also want a similar system to monitor the ELF EMFs from power networks.

Brazil – Dom Bukoa explained that a national law was introduced in 2010, which considers both public and workers. All information has to be made publically available. The law does not specify the limits, at present they use ICNIRP. Industry has 90 days to devise and adopt a remedy in case of violations. Fields around power lines are assessed by calculations with spot measurements to check and validate them. Perimeter of large substations is assessed by measurement, and inside, every path the worker can walk along is measured. Not unexpectedly, around some generators the fields are quite high.

Compliance is more difficult for urban lines, as they have been in place for some time. Homes have been built under lines etc.

Live line maintenance – workers may be exposed to high field conditions. The Government is trying to change the conditions to reduce exposures. These present a major challenge along with establishing limits for the UHV DC lines that are 2500 km long, across the Amazon region.

Argentina - Jorge Skvarca described what he saw as one of the difficulties, in that South America is different to the rest of the world. Except in Brazil, few are following any of the current science.

There may be rules, but very few are complying. Authorities at national level have no or little power as it has been devolved to Local Authorities, who make the decisions.

16:30 Administrative business

E. van Deventer

Resource mobilization

Dr van Deventer thanked again those national authorities that continued to contribute funds to ensure the administration of the project could continue and those that provided contributions in kind, either through supporting specific activities (as Health Canada and the Slovenian Health Ministry have supported this meeting) or providing services, for example the time of technical experts to draft material for WHO.

The coming two years will see increased pressure as the final stage of the project takes shape in the form of pulling all the relevant data together to draft the RF Radiation Health Risk Assessment. She would be approaching national authorities separately to seek contributions to this vital stage in the project.

17:00 Close of meeting

WITH THANKS TO Ministry of Health of Slovenia and Health Canada



REPUBLIC OF SLOVENIA
MINISTRY OF HEALTH

SLOVENIAN RADIATION
PROTECTION ADMINISTRATION



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FOR THEIR FINANCIAL SUPPORT OF THE 16TH IAC MEETING