

German-Japanese Forum on Risk Management and Communication about Mobile EMF

**Deutsche Telekom Bildungszentrum,
Stuttgart, Germany,
25 May 2005.**

Symposium proceedings

**Edited by
Mariko Nishizawa and Ortwin Renn**

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Table of Contents

1. Introduction Nishizawa & Renn	p.3
2. The final programme	p.4
3. Risk Perception of Mobile EMF: The Roots of Health Anxieties in Europe and Beyond Adam Burgess	p.7
4. International studies on public perception of mobile EMF Jack Rowley	p.11
5. Risk perception of mobile EMF and citizen movement in Japan Mariko Nishizawa	p.18
6. Public perception of mobile EMF in Germany Holger Schütz and Dr. Peter M. Wiedemann	p.24
7. Risk management and communication in Germany Christiane Pölzl	p.31
8. Risk management and communication in Japan Chiyoji Ohkubo	p.35
9. Risk Management and communication: A review of international differences Tamsin Greulich and Ray Kemp	p.41
10. Mobile Phones and Health – A UK Perspective John Stather	p.56
11. Addressing Mobile Phone EMF Issues in Japan: DoCoMo's Approaches Hideaki Okamoto	p.67
12. Mobile EMF and Industry's approach in Germany Philipp Kornstädt	p.72

1. Introduction

Risks of mobile EMF are perceived differently in local and national contexts. Especially since the late the 1990s, local protest movements against the construction of mobile base stations are on increase in different parts of the worlds like German, Japan and the UK. What are the reasons for this protest and how can risk managers deal with the protest? How can the results of risk assessments be communicated to a wider public and in which form should the uncertainties and ambiguities associated with EMF risks be included in communication efforts?

These questions are at the heart of a joint symposium to exchange ideas about the challenges of risk management and communication and potential solutions in different national and international contexts.

The principal objective of the forum is to initiate a learning process between the Japanese and the European scientists and communication specialists about issues vis-à-vis mobile EMF. More concretely, this symposium will address the issues of public perception of mobile EMF in the international context; present a number of important issues of risk management and communication in relation to possible health risks of EMF; and exchange ideas in terms of science information, management approach (such as precaution), consumer education and public involvement.

What lessons can be drawn from the management and communication experiences of each country? What can be transferred from one country to another? What is unique for either the Japanese or the German culture when addressing this specific issue?

We would like to welcome you to join us in this one-day forum in Stuttgart.

This forum is jointly funded by the Japanese Science and Technology Agency (JST), a public funding agency of Japan and the Federal Ministry for the Environment of Germany.

Special thanks to Christina Benighaus, Reiko Kawamura, Yumi Sugiura and Stephan Wenninger for their support in organising this forum. Rüdiger Goldschmidt, Alexander Sautter and Frank Ulmer help us in many other ways.

Stuttgart, 25 May 2005

Dr Mariko Nishizawa & Professor Ortwin Renn

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2. The final programme

German-Japanese Forum on Risk Management and Communication about Mobile EMF

25 May 2005

Deutsche Telekom Bildungszentrum Stuttgart,
Germany

Aim

This forum aims to address the current lack of exchange of practices and communication with respect to risks of mobile electromagnetic field (EMF). The forum will convene social scientists, communication specialists, public administrators and policy makers to exchange their experiences and discuss common approaches and challenges when managing EMF risks and communicating about these risks with the public. Public concerns about the risks of EMF exposure from mobile telephone, especially that from bases stations have started to grow in Japan. The same is true for Germany: there has been opposition to the siting of base stations in a number of communities. New communication programs and community involvement projects have been started to address these concerns. The objective of the forum is to initiate a learning process between the Japanese and the European scientists and communication specialists. What lessons can be drawn from the experiences of each country? What can be transferred from one country to the other country?

What is unique for either the Japanese or the German culture when addressing this specific issue?

Major topics for discussions

- Address the issues of public perception of mobile EMF in the international context;
- Present a number of important issues of risk management and communication in related to possible health risks of EMF; and
- Learning from their experiences in terms of science information, management approach (such as precaution) consumer education and public involvement.

Timetable

- 9:30-9:35 Opening
(Mariko Nishizawa)
- 9:35-10:05 Risk Perception of Mobile EMF: The Roots of Health Anxieties in Europe and Beyond
(Adam Burgess)
- 10:05-10:35 Risk perception of mobile EMF and citizen movement in Japan
(Mariko Nishizawa)
- 10:35-11:05 Public perception of mobile EMF in Germany
(Holger Schütz)
- 11:05-11:30 Coffee break
- 11:30-12:00 *Panel discussion: Perception of EMF in comparative perspective*
(Adam Burgess, Saburo Ikeda, Mariko Nishizawa and Holger Schütz, Moderation: Ortwin Renn)
- 12:00-13:00 Lunch
- 13:00-13:30 Risk management and communication in Germany
(Christiane Pözl)
- 13:30-14:00 Risk management and communication in Japan
(Chiyoji Ohkubo)
- 14:00-14:30 Risk Management and communication: A review of international differences
(Tamsin Greulich)
- 14:30-15:00 Risk management and communication in other European countries: Mobile Phones and Health - the UK perspective
(John Stather)
- 15:00-15:20 Coffee Break
- 15:20-15:55 *Panel discussion about risk management and communication*
(Michael Schüller, Tamsin Greulich, Chiyoji Ohkubo and John Stather, Moderation: Mariko Nishizawa)
- 15:55-16:20 Mobile EMF and Industry's approach in Germany
(Phillipp Kornstädt)
- 16:20-16:55 Addressing Mobile Phone EMF Issues in Japan: DoCoMo's Approaches
(Hideaki Okamoto)
- 16:55-17:20 *Panel discussion about public-private partnerships in EMF risk management*
(Phillipp Kornstädt, Mariko Nishizawa and Hideaki Okamoto, Moderation: Ortwin Renn)
- 17:20 Closing remarks
(Ortwin Renn/Mariko Nishizawa)
- 17:30 Adjourn

Invited speakers

- Dr. Adam Burgess, University of Kent, UK
- Tamsin Greulich, Galson Sciences, Ltd., UK
- Phillipp Kornstädt, T-Mobile, Germany
- Dr. Mariko Nishizawa, University of Stuttgart, Germany and Japan
- Dr. Chiyoji Ohkubo, WHO, Geneva
- Hideaki Okamoto, NTT-Docomo, Japan
- Christiane Pözl, Federal Office for Radiation Protection (BfS), Germany
- Prof. Ortwin Renn, University of Stuttgart, Germany
- Dr. Michael Schüller, Vodaphone D2 GmbH, Germany
- Holger Schütz, Research Center Jülich, Germany
- Dr. John Stather, HPA, UK

Further Discussants

- Prof. em. Dr. Suburo Ikeda, Disaster Prevention Research, Japan

Target audience

This is a public forum targeted at various interested parties such as policy makers, industry spokespeople, communication specialists, as well as practitioners engaging in risk communication/science education or risk management in relation to the issues about mobile EMF, primarily in Germany and Japan. In order to facilitate active discussions amongst participants, the number of participants is limited to 25. This is not a public conference.

Financing

The forum will be jointly funded by the Japanese Science and Technology Agency (JST), a public funding agency of Japan and the Federal Ministry for Environmental Protection of Germany. Persons in charge: Dr Ortwin Renn: Ortwin.renn@soz.uni-stuttgart.de, Professor at Stuttgart University and director of the non-profit research institute DIALOGIK GmbH.

Dr. Saburo Ikeda: ikeda-sa@bosai.go.jp, Professor Emeritus, University of Tsukuba.

Proceedings

All speakers are asked to provide a four to five-page manuscript. The manuscripts will be published either in a journal (special issue) or in a separate proceedings monograph.

Organisation:

Principal Organizer (academic inquiry and registration)

Dr Mariko Nishizawa: nishizawa@soz.uni-stuttgart.de, University of Stuttgart

Inquiry concerning proceedings and manuscript

Yumi Sugiura: yumisugiura@suou.waseda.jp

Inquiry concerning hotel booking and travel information

Stephan Wenninger: nemesismiller@gmx.net

3. The Social and Historical Construction of Mobile EMF Anxieties: Some Thoughts for Stuttgart Forum May 2005

Dr. Adam Burgess, University of Kent

It is important not to react to anxieties about mobile EMF as if they were a given, fixed and inevitable phenomenon. The historical and contemporary evidence contradicts this understanding. We need to tease apart the variety of influences, pressures and contextual factors that allow for the social and political construction of anxieties about a phenomenon that is invisible, intangible and consequently rarely spontaneously articulated.

From my research it appears that even in the case of what we understand to be the most sensitive issue – masts near schools – the reaction is far from given. Masts are not necessarily noticed or distinguished from other antennae, and I interviewed parents who only became ‘concerned’ once attention was drawn to the structures by representatives of the media confronting parents as they entered the school. In practical terms the danger is of imposing a set of assumptions upon reactions that are inevitably more complex and fluid. This is particularly the case with mobile EMF because there is little public knowledge of this fundamentally obscure scientific area, nor any spontaneous means through which have any experience. In the main it is a theoretical objection to a hypothetical threat, most typically justified by concern about impact upon future generations. The further peculiarity is that all parties recognise that there can be little consequence to reactions; the mobile network is here to stay, as much as is their indispensability to the social lives of young people in contemporary society. In this sense we can understand that the attention focused on masts rather than handsets – whilst scientifically illogical – reflects the very pragmatic character of even the most apparently determined opponents of mobile EMF (most of whom use mobile phones!).

Take the example of those campaigning against mobile masts in the UK. What emerged from my interviews with campaigners (when asked to recall how they became concerned specifically about the health dimension) was a tale of competing issues where health only became predominant because of particular external pressures and influences. In cases where masts did evoke reactions we can first of all observe that these reactions are highly individualised, not least because masts have a very particular impact – they are not like the threat of a nuclear power station or even waste facility that has the potential to create a wider, more unified reaction. The character of these reactions can be divided into:

- economic (impact upon property prices)
- aesthetic (impact upon the view)
- democratic (the lack of prior consultation about mast erection)
- health-related.

It was invariably the lack of consultation that was initially most prominent; the sheer disbelief that in this age of consumer rights and redress an ugly structure could ‘just appear’ without local residents having been consulted. It was this anger that provided initial impetus to anti-mast campaigning. By contrast, there is a self-consciousness about publicly arguing on the ‘selfish’ grounds of property price impact and a lack of force about contestation on aesthetic grounds. In an age where health has been elevated to the defining reason for being, it is perhaps unsurprising that this element would emerge as the strongest – despite the lack of knowledge or experience of EMF effects. The general background factor that made this possible was the sustained media campaign publicising any study that suggested an effect from mobile EMF since 1996 in the UK. Whilst few had any concrete knowledge derived from the media, concern about masts did prompt memories of something being amiss or at least uncertain about mobile phones. But in the case of most of those who became campaigners there was usually a more direct media input, such as that described above where reporters spoke to parents as they entered the school. Newspapers became organising centres for concern, putting readers in contact with established campaigners and thereby consolidating the health dimension of concerns.

Other influences were also important in allowing health concerns to become more important than other annoyances about masts (and certainly the easiest one to articulate if a campaign actually took off). Most important, certainly in the early 2000’s was the fact that the government had held an enquiry that had apparently and very surprisingly vindicated their concerns. For campaigners, the Stewart Enquiry was the most important affirmation that what they were doing was right, worthwhile and even important. Having pointed to these influences, it should be recognised that reactions are rarely sustained for very long. The group who first began campaigning against masts in the UK have long since become inactive. Subsequently there has been a process of continual change, as individuals come to some kind of accommodation even if that has been simply moving house!

Incidentally, if we survey the international scene we can identify patterns where different combinations of these four factors – the economic, aesthetic, democratic and health related - are prominent. In the USA, for example, anti-mast campaigning has remained almost exclusively aesthetically centred – reflected in its geographical concentration in areas of scenic beauty like Vermont. In Italy, by contrast, anxieties about have been more easily consolidated given the already existing language and concern about ‘electro smog’. In many developing countries like Egypt the reaction can be described as a more conventional ‘technophobic’ reaction; the basic suspicion that technology is unnatural and inevitably harmful in some way or another.

So that is some remarks on the very social and contingent nature of reactions – now some remarks on the historical aspects. A useful starting point are striking historical contrasts that suggest a very different kind of reaction before the very modern era that began in the USA in the late 1960s. Comparison with other technologies such as x-ray and radar suggests an inverse pattern of reaction where the more dangerous the technology the more limited the reaction and vice versa. High frequency X-rays are at the dangerous,

ionising end of the electromagnetic spectrum. Their appearance at the turn of the 20th Century was greeted with widespread public enthusiasm – such that everyone wanted to be exposed to x-rays amidst hopes that they could cure just about anything and generally improve the human condition. In stark contrast to the post 1960s era, this was a pre-war era defined by continued belief in progress. Under these circumstances the notion of significant human harm from a ‘miracle machine’ could make no impact. The microwave-based technology of radar was greeted with a more practical enthusiasm as a device that helped ‘win the war’. Despite occasional reports of service men being harmed by continued exposure, these stories made no impact given the dramatically favourable cost/benefit balance involved. But it is important not to see the contemporary appearance of anxieties as simply due to a different configuration of cost and benefit. The precondition for the emergence of contemporary EMF anxieties are a set of interrelated assumptions based upon the elevation of environmental, health and consumer sensibilities combined with the distinctively fragile sense of humanity that emerged from the 1960s onwards.

A series of technologies from microwave ovens to powerlines and VDU screens became the focus of anxiety in the USA. These were driven by the adept consumer activism of journalist Paul Brodeur. He gained an extraordinary amount of publicity within a media that was becoming increasingly obsessed with consumer health issues. Increasingly defensive institutional reactions prolonged the shelf life of each of these issues. Yet, particularly given the usefulness of these particular technologies, none of these ‘panics’ lasted very long; the sheer utility of a device like the microwave oven relatively quickly cancelled out abstract safety concerns. Yet unease was never dispelled and campaigners like Brodeur intuitively sensed that there was more to exploit and simply shifted their attentions to the next potential microwave target. It is actually important to understand that mobile EMF is only another microwave issue that appeared at a time when interest in VDU dangers and power lines was waning. Not only has there been a process of mobile EMF anxiety diffusing internationally from its original American base, but also a process of diffusion across technologies.

Despite their apparently very general, historical nature there is a very direct practical point to emerge from this with regard to how we respond to mobile EMF anxiety. It should not be treated as a given, fixed phenomenon – this means it shouldn’t be addressed as if it is simply inevitable suspicions about how the technology might harm our health. As has been suggested, reactions are a mix of different elements.

The danger here is of imposing a health-based agenda through responding too immediately and defensively; effectively creating an exclusively health-based reaction that was previously not there. This is particularly relevant because there is much evidence to suggest that this is an anxiety that really has been created principally ‘from above’ by entrepreneurial individuals, a receptive media and overly defensive authorities.

About the author

Adam Burgess is a lecturer in sociology at the University of Kent and that he has addressed numerous international conferences on the subject of mobile phone risks and also written widely on the subject - for example:

Cellular Phones, Public Fears and a Culture of Precaution (New York: Cambridge University Press, 2004)

'A Precautionary Tale: The British Response to Cell Phone EMF,' *Technology and Society*, 21 (4)

'Comparing National Responses to Perceived Health Risks from Mobile Phone Masts,' *Health, Risk and Society*, 4 (2)

4. International studies on public perception of mobile EMF

Dr. Jack Rowley, GSM Association¹
(jrowley@gsm.org)

Introduction

This paper reviews seven studies covering several countries of electromagnetic field (EMF) risk perception in relation to public concern about the use of handsets or living near mobile communications masts². A wide range of approaches, measures and end points have been used, however, it is still possible to present qualitative comparisons and identify trends. Some of this data has been presented elsewhere [1] and additional data on other European countries is available at the web site of that seminar.³

Austria (2004)

This study [2] set out to examine whether or not persons who participated in public hearings about mobile communications masts were more concerned about possible health risks. The level of concern was also compared to other prompted environmental hazards. The study compared the responses to questionnaires (n=123) distributed at four public meetings on mast siting, with a control group (n=366) that consisted of medical students during pre-clinical training. The agents⁴ were compared on a six points scale from 'no risk at all' to 'very high risk.' For all agents, except mobile phones and celltowers, there was close agreement between the groups. However, for mobile phones and celltowers, public meeting participants rated the risk as slightly above 3 (between traffic noise and vehicle exhaust), while the control group rated them about 2 (similar to air travelling). There was a tendency for risk perception to increase with age and among women. Also phone users tended to rate the risks as lower than non-users. The authors conclude that their study does not show exceptionally high levels of concern among opponents of celltowers.

Britain (1998 – 2003)

Mobile phone concerns have become a regular feature of studies of risk perception in the UK [3-6]. The British mobile communications industry has been tracking attitudes to mobile phone handset and base station health concerns since 1998. A comprehensive analysis of this data to the end of 2003 has been conducted by MORI [7] so only key points are summarised.

The data shows a clear distinction between *unprompted* and *prompted* concern about mobile phones or masts, with the combined unprompted concern at 5% and prompted

¹ The views expressed in this article are those of the author and except where indicated may not be representative of any organization mentioned.

² This paper does not include the studies funded by the Bundesamt für Strahlenschutz in Germany in the assumption that they are familiar to the audience or will be addressed by other speakers.

³ http://www.jrc.cec.eu.int/eis-emf/1214_july_ispra.cfm.

⁴ Asbestos, Smoking, Nuclear Power Plant, Vehicle Exhaust, Traffic Noise, Air Travelling, Mobile Phones, Celltowers.

more than 4 times higher at 22%. Unprompted there is no measurable difference in concern about handsets of masts, but when prompted, there is slightly greater concern about masts. This may reflect the greater personal utility of handsets, as an inverse relationship between perceived risk and benefit of technologies has been reported [8], which is consistent with the finding that risk perception is weak predictor of consumer behaviour [9]. In the case of masts, there are elements of an imposed perceived risk and concerns about chronic exposures, perhaps in particular to children [10]. The average level of health concerns has remained fairly constant over time with peaks perhaps associated with specific events⁵, though there is a downward trend in concern about handsets. The data also indicates that the group who say they are concerned, are also responding to inappropriate use and other social concerns. There is a lack of understanding about the technology with 26% disagreeing with the statement: *Mobile phones cannot work well without a mast being reasonably near to them.*⁶ The influence of the media in risk perception is shown in the finding that 68%⁷ stated that the source of their concern was stories they have seen on TV [11]. While other research has shown evidence of a bias to believe bad news [12], the media influence should not be overstated [13].

Chile (2003)

This study [14] was not specifically aimed at mobile communications but instead sought to characterise general risk perception in Chile based on a psychometric paradigm. Differences between perceived social and personal risk were assessed by means of a survey (n=508) for 54 hazards (10 point scale), grouped as: environmental, technological, transport, addictive substances, chemicals, natural disasters or social ills, and others. In relation to *perceived personal risk*, mast antennas rated about 5, placing them about 17th overall and at 3rd position for the category 'technological hazards'. When the assessment was changed to *perceived social risk*, masts rose to a rating of 6, but now placed 32nd overall and 2nd for technological hazards. In an interesting extension, a risk-benefit balance was computed, and this was slightly negative for both social and personal judgments. The reasons for concern were plotted against three factors: *Dread Risk*, *Unknown Risk* and *Personal Effects*, with *Unknown risk* being the dominant factor for masts (2 on a 3 point scale) and the factors both close to zero. This study indicates that acceptance of mobile communications should not be taken for granted in developing countries despite the evidence of important social and individual benefits [15].

Denmark (2004)

As part of responding to public concern about 3G deployments a survey and three focus groups examined public concerns [16]. The survey (n=534) found that one in three was concerned about mobile phones, with greater concern among women and the elderly. It also showed a high level of scepticism about information provided by industry or government, with greater trust in consumer organisations and health authorities. The

⁵ For example, release of the IEGMP 'Stewart' Report in May 2000, <http://www.iegmp.org.uk/>.

⁶ MOA/MORI. Base: All GB adults aged 15+ (2,046), September 2003.

⁷ MOA/MORI. Base: All who agree mobile phones are not safe to use because of the health risks (108), September 2003.

focus groups⁸ found that people experienced a dilemma in choosing between acknowledged benefits and uncertain risks.

European Union (2003)

A Eurobarometer survey [17] was conducted in all the Member States⁹ of the European Union between 28 October and 8 December 2002, to examine smoking habits and attitudes to the environment and health. The results are summarised in Figure 1, which shows that more than 90% of people are concerned about chemicals in most European Union countries, whereas masts are at 13th and mobile phones at 14th of the 16 items, with only about 50% concerned. There are some interesting variations among this overall picture with Finns expressing only 20.9% concern about mobile phones, while Italy is at 74.7%, yet both have very high levels of mobile phone usage among the population. A second question asked respondents whether they thought that the agent affected the health of someone in their close family. In this case the EU15 average was 1.6% for mobile phones (Belgium 0.4%, Germany 2.6%) and 3.6% for masts (Denmark and Greece 0.3%, Germany 3.1%). These findings are particularly interesting given the high level of scientific research investment in Germany and the recent significant concern about masts in both Denmark and Greece. Clearly, perceptions about risk are not static.

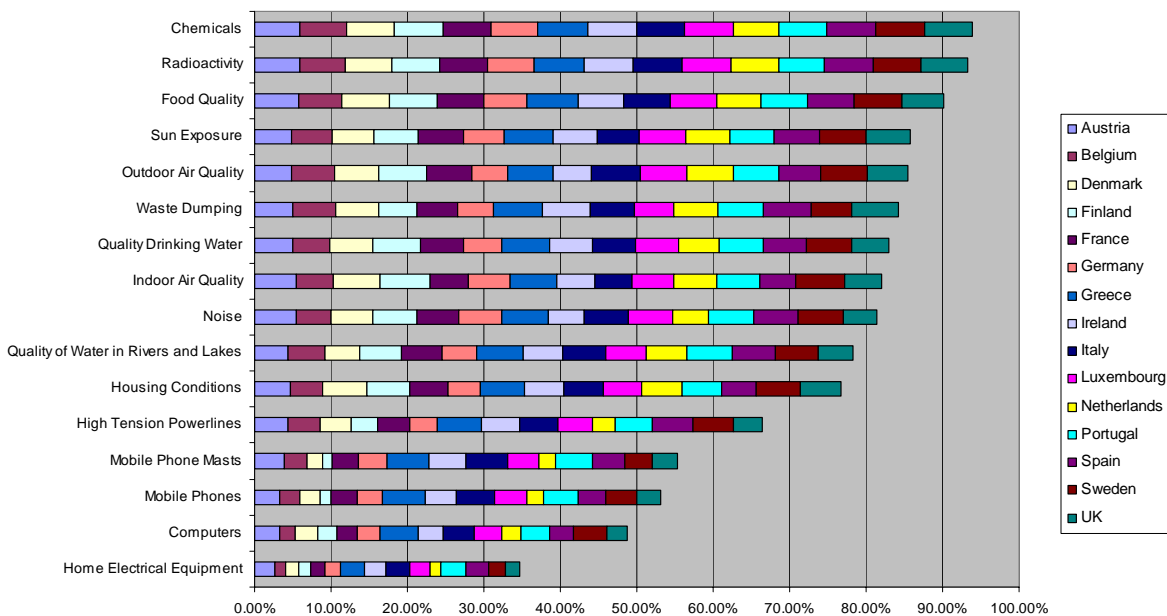


Figure 1: Answer ‘yes’ to the question: *Do you think this factor affects health?* in Special Eurobarometer 183, Wave 58.2, Autumn 2002.

⁸ Group 1 consisted of the parents of children in four schools that had expressed concern about masts being placed on school buildings. Group 2 included representatives from professional EMF lobby organisations. Group 3 consisted mainly of young, high frequency users of mobile phones and IT-business people highly dependent on mobile phones in their jobs.

⁹ Belgium, Denmark, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden, United Kingdom.

New Zealand (2001)

This study on the relationship between worries about modernity and reported symptoms, included mobile phones and masts among the list of ‘modern worries’ [18]. It combined the results of two surveys, the first on University students (n=526) and the second a general survey of the adult population over 15 (n=7869). Mobile phone towers were positioned at 23 and phones at 25, on a list of 25 items, the former rating 2.25 and the latter 2 on a 5-point scale from *no concern* to *extreme concern*. Two general observations are interesting. One, concern about modern worries was significantly associated with the importance of health to individuals and, two, that such worries are strongly associated with visits to non-medical health professionals.

Vodafone/MORI International Survey of Attitudes (2003)

In late 2003 Vodafone commissioned MORI to examine public concerns about handsets and base stations in 14 countries¹⁰ and more than 17,000 interviews were conducted. It is planned to repeat this process every two-years [19]. Some of this data has been presented previously [1] so key findings only are again summarised. The average level of combined unprompted concern about handsets and masts across all surveyed countries was 6.6% (New Zealand less than 0.5%, Germany 4%, Japan 23%). More details of relevance to this Forum are the findings for Germany and Japan. For Germany, 3% were concerned about handsets and 2% about masts. For Japan the corresponding numbers are 19% and 10%. When asked to agree or disagree with the statement ‘*I do not believe that mobile phones are safe to use*’, the results for Germany were 38% agree and 28% disagree, and for Japan, 25% and 24% respectively. The latter result indicating that a high proportion of the population is undecided, despite a 94% penetration rate. Despite concerns about health, only 15% of Germans and 23% of Japanese say that these affect their usage. When asked about research 31% of Germans but only 6% of Japanese felt that authorities had done enough research on possible health effects of using mobile phones. Similar responses were reported for research supported by operators and manufacturers. There were differences in attitudes towards trusted sources of information, especially towards the WHO. In Germany the results for trust in Doctors, Scientists and WHO were 20%, 17% and 8% respectively, while in Japan the same agencies rated 17%, 13% and 19%. In both countries government agencies and industry rated similarly on trust, 1 to 4%. In relation to masts other differences were revealed, with 15% of Germans and 45% of Japanese showing a lack of understanding of the need for masts. However, this does not translate directly into objections about masts as shown in Table 1. In both countries a significant proportion say that they would object to a mast proposed for their local area. This suggests the magnitude of the challenge facing all those involved in the site selection and approval process. It reinforces the need for communication activities to improve understanding about the need for masts and the current scientific consensus regarding safety. It also highlights the political reality where public interest and opposition may motivate politicians to adopt policies whose consequences are not fully analysed.

¹⁰ Australia, Egypt, Germany, Greece, Hungary, Ireland, Italy, Japan, Malta, New Zealand, Portugal, Spain, Sweden and United Kingdom.

	No reaction	Suspicious	Want more info	Want to move	Would object	Welcome it	Camouflaged	Want advance	Don't know	Don't know what it is
Germany	15%	25%	20%	6%	22%	5%	9%	18%	8%	8%
Japan	15%	11%	24%	5%	15%	7%	13%	27%	3%	11%

Table 1: Reaction to a mast in local area, based on responses to the question: *What would be your reaction if mobile phone network providers placed a mobile phone base station in your neighbourhood?*¹¹

Conclusions

The consensus scientific view remains that there is an absence of convincing scientific evidence of a health risk for exposures to EMFs at levels below those recommended in international guidelines [20]. However, as the reviewed studies show, the public perception is of greater scientific uncertainty, especially about the safety of masts, and of significant distrust of the information provided by industry and governmental authorities. All studies show public interest in additional information, especially from health or consumer organisations, however, there are risks in such efforts [21]. In addition, scientists commenting on topical issues or reporting preliminary results should be mindful of how they can ensure responsible media coverage [22]. Those countries (e.g., Austria, Britain, Denmark) for which risk perception data is available over time show that the issue can grow or diminish under the influence of local social and political factors. There are three key lessons from these studies for industry, government and the public. First, the public is interested in information but this must come from reputable third parties, acknowledge any uncertainties and be prepared in anticipation of possible concern. The WHO guidelines can provide some assistance in these matters [23]. Second, those countries with the lowest level of concern have regulatory structures that emphasise the underlying scientific consensus and do not permit local authorities to become caught up in debates on threshold levels. Third, a clear and formal dialogue with opportunities for objections to be heard is important, but equally importantly, at the end of the process there must be a final decision making body that is independent of political influence.

Acknowledgements

The cooperation of the Mobile Operators Association, Mobile Manufacturers Forum and Vodafone Group Ltd in sharing data from surveys is gratefully acknowledged.

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5. Risk perception of mobile EMF and citizen movement in Japan

Dr. Mariko Nishizawa, University of Stuttgart
(isfmm@soz.uni-stuttgart.de)

Risk perception

Risk perception is often a cause of social conflicts because different groups perceive risks differently. Understanding the process in which risk perception is being constructed is therefore crucial to devise effective risk communication programme.

It has been known that risk is inherently subjective, and people tend to distinguish risks and acceptability of certain technologies according to tangible personal benefits. If the perceived benefits outweigh perceived risks, people show willingness in accepting potential risks, and an acceptable risk-benefit trade-off occurs (Frewer, Shepherd and Sparks, 1994). People also perceive risks based on values, depending on whether they are involuntary, unpreventable, unfamiliar, or inequitably distributed. It is therefore not surprising that lay and expert perceive risks differently (Flynn and Slovic, 1999). There are risks like risks associated with smoking or drinking alcohol, about which experts are concerned, but the public is less worried, or denies that they are at risk (Slovic, 2000). On the other hand, there are risks which members of the public feel that they are quite at large, while expert judge the risk very small. A good example is nuclear waste disposal.

Risk perception of EMF

To date, there is an increasing awareness of potential risks of EMF (electromagnetic field) to human health. But risk perception about mobile EMF also shows complex features – it has been suggested that people tend to perceive EMF exposure from mobile communications masts to be a more serious issue than that from handsets.

In a German survey, nearly nine in ten saw the benefits of mobile phone, and only around 20% responded that the risk of radiation using mobile phone is unacceptable (Zwick and Renn, 2002). A similar survey conducted in Great Britain demonstrated a corresponding result (Rowley, 2004) - more than a half of the respondents believe that the benefits of using a mobile phone outweigh any potential health risks. However, the same British survey revealed that a nearly half of the survey respondents said that they would object a mast in local area. Similarly, a 2003 German survey shows higher negative perception of possible health risk from base stations than from handsets (infas, 2003). The different perception of EMF was repeated in a global study conducted in fourteen countries that include the UK, Japan, Germany, Australia and Sweden (Rowley, 2004).

It now seems that this negative perception of EMF exposure from base station is closely related to factors such as involuntary exposure, lack of personal control, unfamiliarity, fear/dread and unfairness, and that the less negative perception about EMF from handsets corresponds to a linear relationship between personal benefits and risk acceptance for

various hazards. As we noted earlier, people are more averse to imposed risks than the risks that they feel they can control.

It is important to note that the higher risk perception of EMF from base stations is in inverse to what scientific studies have established so far. According to WHO (2004), if there was a health risk from EMF, the most likely source is from mobile handsets which produce exposures to the brain, but less likely to come from mobile phone base stations, where the exposure to the public is low and comparable to broadcast exposures which have been present for many decades without any adverse effects (p.28).

There is another aspect about people's risk perception of EMF that needs more careful attention - how do people gain scientific knowledge of EMF based on which they form their views about it? This is an important aspect to be addressed, since people's belief in risk is not easily altered once it has been made (Wiedemann and Schütz, 2002).

In fact, previous studies have shown that people are not sufficiently informed about the science of EMF. The German study noted earlier showed that only a small proportion of people (20%) said that they were well-informed about EMF (infas, 2003). Similarly, the British MORI survey mentioned earlier showed that up to 45% of people do not make the connection that mobile phones need to have a mast in the vicinity to work (MORI, 2003). Why, then, there is an increasing risk perception of mobile EMF?

Media reporting

An aspect for urgent investigation would be the relationship between risk perception about mobile phone and the influence of media reporting about health hazards caused by EMF. It is known that the building of belief and opinions about negative health effects of science and technology relies on selective, sensationalised information distributed by the (conventional) mass media. For instance, the mass media has exerted enormous influence on the formation of negative public opinions and fuelled public protests against genetically-modified food in Japan (Nishizawa and Renn, forthcoming) and the UK (O'Neill, 2002; POST, 2000), or hormone disrupting chemicals (Nishikawa, 2003). With respect to EMF, the media is the major source of negative information (MORI, 2003; Rowley, 2004). This is not surprising as previous studies have shown that the public receive predominant amount of information about possible health risks from the state-of-the-art science and technology from the media (Council of Ministers of Japan, 2003).

A recent content analysis on newspaper articles about EMF in Japan shows a link between media reporting and its influence on the formation of public views about health risks of EMF (Nishizawa, submitted). The amount of media coverage about EMF issues has increased more than six times between 1993 and 2003. In particular, more than 700 articles written in Japanese daily papers in 2003. Similarly, articles that addressed the issues of EMF specific to mobile base stations increased as many as eight times during the same period of time. These articles often refer to potential health hazards by EMF such as cancer and leukaemia, and demand a precaution-based approach or tighter regulation of EMF. This increased newspaper coverage of EMF corresponds to the

dramatic increase of public protests against building mobile phone base stations in Japan in recent years. In several cases, it has gone so far that local citizens went to court against mobile operators for health hazards of EMF emitted from mobile communications masts (Nishizawa, in preparation).

The Internet

Another source that has been transmitting negative information about science of EMF is the Internet. According to a series of empirical studies that the author has recently conducted in Kyushu, Shikoku and Tokyo, local protest groups against the operation of mobile base stations largely relied on the Internet to obtain scientific information of EMF. It was also found that a large amount of information about EMF released on the Internet was distributed by several nationwide citizen networks concerned about or against EMF exposure (Nishizawa, in preparation). The networks regularly publish news on the Internet by inviting commentaries of scientists who take a sceptical stance on conventional science and demand the implementation of the precautionary principle in risk management of EMF.

It now seems that both the conventional and new communications media play a pivotal role in the formation of risk perception of EMF by way of “risk amplification” (Kasperson et al. 1988). This very nature of social construction of risks vis-à-vis mobile EMF needs more careful investigation. Unless this has been done, more viable risk communication programme about mobile EMF may remain limited.

This presentation will address the issues of how the people engaged in protest movements against mobile base stations obtain information about potential health hazards of EMF and how the communications media play a role in influencing the construction of their risk perception about mobile EMF.

23 May 2005

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About the author

Mariko Nishizawa, PhD

Research Associate, Sociology of Technology and the Environment, University of Stuttgart, Germany

nishizawa@soz.uni-stuttgart.de, nishizawa_riskmanagement@hotmail.com
Tel/Fax + 49 711 121 4298

Training

PhD (Risk policy and communication, Imperial College London)

Research focus

Public perception about science and technology; public trust towards professionals; socio-political and cultural implications of science and technology; and improvement of risk management and risk/science communication.

Recent publications in peer-reviewed journal

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6. Public risk perception of mobile EMF in Germany

Holger Schütz & Dr. Peter M. Wiedemann, Research Centre Jülich

Introduction

Mobile telephony is an extensively used technology in Germany. Over the last years the number of people using mobile phones has been rising to about 71 million (IZMF 2005). Despite this high acceptance, there are also concerns about possible adverse health effects from the radio frequency electromagnetic fields (RF EMF) emitted by mobile phones and base stations. These concerns are nurtured by findings of scientific studies indicating that RF EMF might influence biological processes in humans. Although so far there is no scientific proof that RF EMF (below the existing limit values) can cause adverse health effects, the possibility cannot be ruled out either (IEGMP 2000; NRPB 2004; SSK 2001). Hence, many people call for precautionary measures.

Various types of precautionary measures have been taken into consideration, including more research, better risk communication, exposure minimization strategies, and stricter exposure limits. Options that have been chosen in different countries include participatory site selection of base stations in the Netherlands, stricter exposure limits in Switzerland, and better risk communication in the UK (public access to data bases revealing the sites and technical features of the base stations), as well as labeling of cellular phones (discussed in Germany) and general exposure reduction measures.

But public health protection is not the only purpose of precautionary measures. At least policy makers seem to see precautionary measures also as a means to mitigate public concern about EMF. However, from a psychological perspective it is doubtful whether this effect will actually occur. More generally, the question is, whether the discussion about precautionary measures will in itself be perceived by the public as an indication that RF EMF actually poses a health risk.

In the following, after providing results from surveys regarding EMF risk perception in Germany, findings from an experimental study will be presented which will give a first answer to this question.

EMF Risk Perception

Data from surveys which actually provide information about public EMF risk perception in Germany are scarce. A study by Schütz & Wiedemann (1998) found perceived risk of mobile phones and of cordless phones to be only of medium size, compared to other consumer products such as cigarettes, chemical household cleaners or microwave ovens. In a representative survey conducted in the state of Baden-Württemberg in the year 2001, mobile phones received the lowest rank in a list of risks including global climate change, BSE, gene food, crime, nuclear power and smoking: About three quarters of the respondents felt hardly or not at all threatened by the risks of mobile phones (Zwick & Renn 2002).

Recently, the German Federal Office for Radiation Protection (BfS) has commissioned – as part of the German Mobile Telecommunication Research Programme (DMF)¹² – a series of representative surveys to investigate public concerns regarding RF EMF from mobile telephony. Figure 1 shows the results from the year 2004 survey. Here too, about three quarters of the German population express little or no concern at all about possible adverse health effects of RF EMF emitted from mobile phone base stations, and about 80 percent feel little or no concern because of mobile phone use. For other EMF emitting devices, such as cordless phones or – in the low frequency range – high voltage power lines, the proportions are even higher.

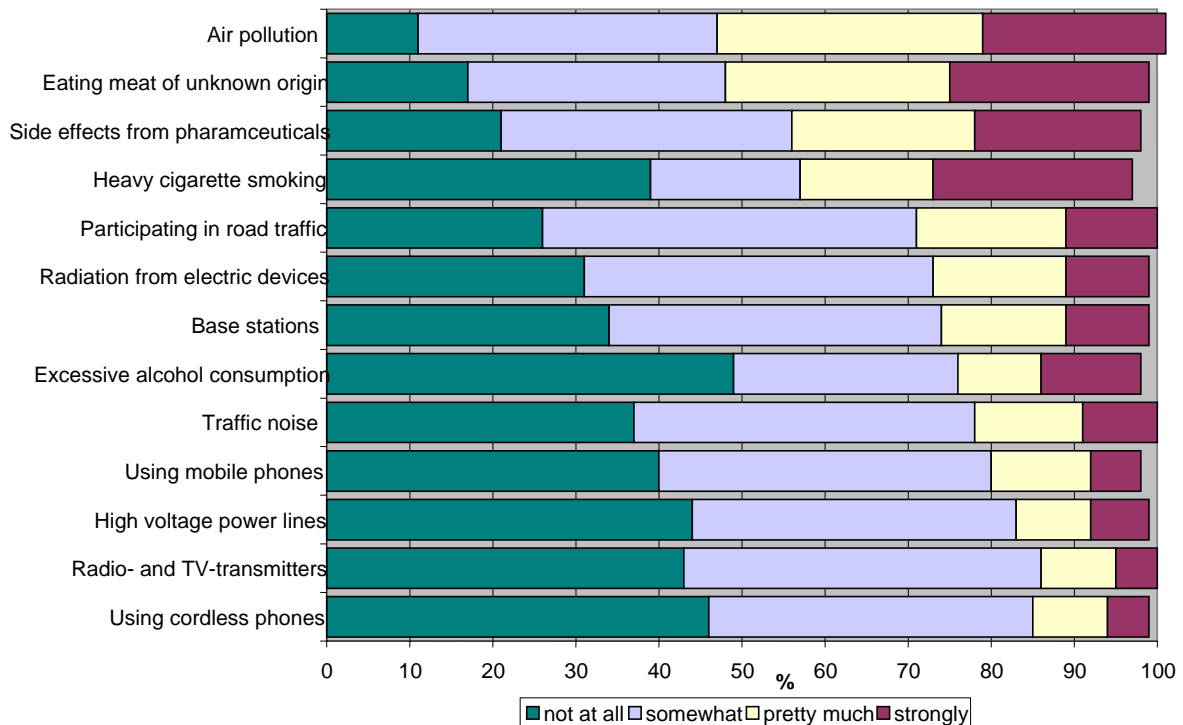


Figure 1: Level of concern about health effects from various sources (based on BfS 2004)

Compared to other health risks, EMF sources receive only medium to low ranks. As Figure 1 shows, more than 50 percent of the Germany population is concerned about air pollution and eating meat of unknown origin. Other risk sources that cause more concern are side effects from pharmaceuticals, heavy smoking and participating in road traffic. Interestingly, the EMF source which causes even (slightly) more concern than base stations, is radiation from electric devices (which refers to low frequency radiation).

Comparison with surveys from 2001 and 2003 indicates, that risk perception of RF EMF technologies has been rather stable over the last years. Figure 2 shows the figures from three surveys conducted in the years 2001, 2003 and 2004. In most cases the percentage of people feeling worried about EMF decreased slightly over the years. Exceptions are

¹² <http://www.emf-forschungsprogramm.de>

radio- and TV-transmitters, and radiation from electric devices, which was clearly lower in 2001.

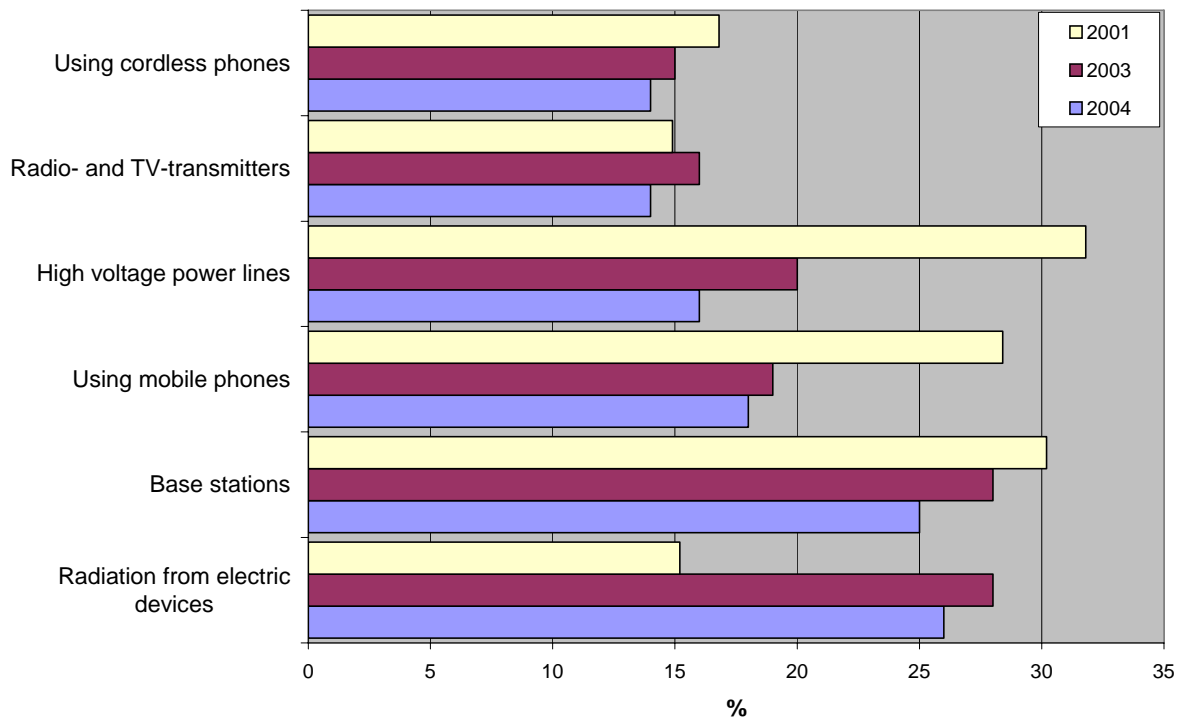


Figure 2: Percentage of people feeling pretty much / strongly concerned about selected EMF sources (based on BfS 2001, 2003, 2004).

Risk Perception and the Precautionary Principle¹³

From a psychological perspective, two conflictive hypotheses regarding the effect of precautionary measures on risk perception can be derived: First, precautionary measures will increase trust in risk management, and in turn, increased trust in risk management will be associated with lower risk perceptions. Second, the alternative hypothesis points to the possibility that precautionary measures will be considered as a cue that the risk might be real. Here, perceived risk should be amplified.

These questions were investigated in an experimental study in which one group of participants received a brief basic text about “electrosmog” (see Table 1). Three other groups of participants received this basic text plus another text fragment, which briefly described a particular precautionary measure (see Table 1).

An Austrian ad hoc sample of 246 subjects, 18 to 81 years of age with a median of 24 years (62% female, 38% male), participated in the experiment. Participants were randomly assigned to the experimental conditions and received a sheet with the text for the respective experimental condition. After having read the text, subjects expressed their risk perceptions on a 7-point rating scale asking “All in all, how threatened do you feel

¹³ This section is based on Wiedemann & Schütz (2005).

about electrosmog?” (with 1 labeled “I don’t feel threatened at all” and 7 labeled “I feel very threatened”).

Table 1: Text fragments used in experimental conditions

Experimental condition	Text
Basic text	A widespread debate about the potential risks related to electrosmog is ongoing. Some scientists argue that substantial uncertainties exist as to whether current protection from electrosmog is sufficient. The International Commission for (Non-Ionising) Radiation Protection points out that current exposure limits protect the public adequately.
Minimization	Basic text + Nevertheless the Commission recommends precautionary measures: Exposure from mobile phone emission is to be kept as low as possible.
Special protection of sensitive areas	Basic text + Nevertheless, following a precautionary approach, many local communities demand that base stations should not be sited near sensitive locations such as day care facilities, schools or hospitals.
Precautionary limits	Basic text + Following a precautionary approach, Switzerland has tightened exposure limits by a factor of ten in areas where people are exposed for long periods of time.

Figure 3 shows the average ratings for each of the four experimental conditions. Clearly, the mean for the “no precaution” condition is much lower than the means for the three “precautionary measures”, which in turn are all close together.

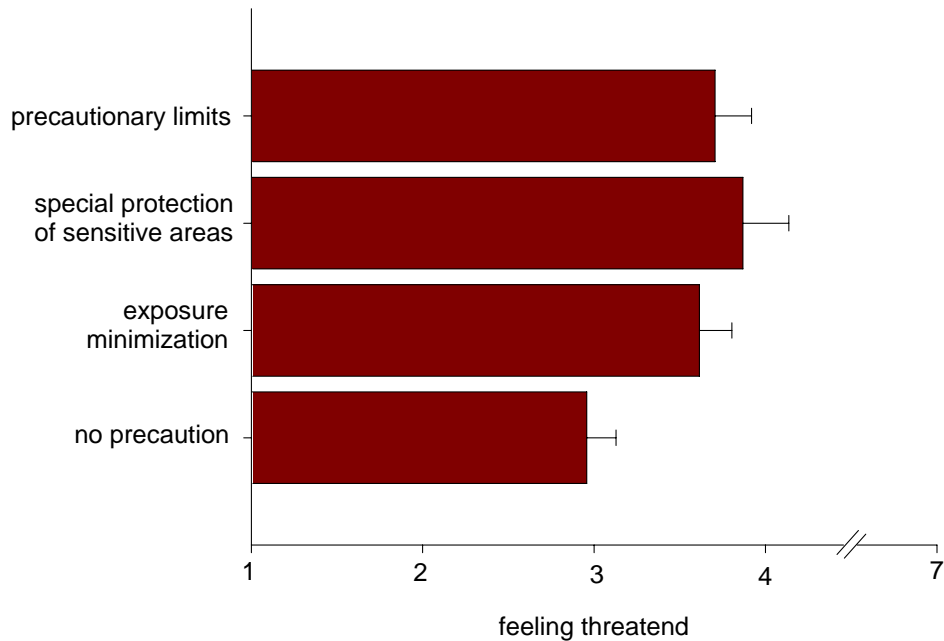


Figure 3: Mean ratings (and standard errors) for the experimental conditions

Statistical analysis (Tukey HSD) shows that it is the “no precaution” condition that is statistically different ($p < 0.05$) from “special protection of sensitive areas” and “precautionary limits,” and marginally statistically different ($p = 0.072$) from “exposure minimization”. The three “precautionary measures” conditions do not differ significantly from each other.

Conclusions

Survey results suggest that EMF related risk sources are not seen as a serious concern by a majority of Germans. Nevertheless, there is a substantial proportion (about 20% – 25%) who express high levels of concern.

The experimental findings reported above cast doubt on a strategy which tries to mitigate public concern by implementing precautionary measures. In fact, the results indicate that the opposite effect might occur: precautionary measures may trigger concerns and amplify EMF-related risk perceptions. Referring to the WHO definition of health (“*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*”, WHO, 1948), it seems that a precautionary approach to mobile phones and base stations could even have adverse effects on health.

Of course, these results need to be confirmed in further experiments before drawing practical conclusions for cautionary policies. Nevertheless, they support the warnings in the WHO-backgrounder on cautionary policies “that such policies be adopted only under the condition that scientific assessments of risk and science-based exposure limits should not be undermined by the adoption of arbitrary cautionary approaches” (WHO, 2000). We tend to add that any precautionary policy should consider possible countervailing

risks such as increasing concern. These adverse impacts of precaution should be brought to the attention of policy makers.

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About the author

Holger Schütz

Holger Schütz studied educational science at the Technical University Braunschweig, Germany. Currently he is working as a senior scientist for the Programme Group Humans, Environment, Technology (MUT) at the Research Centre Jülich. His research interests include risk perception and risk communication, comparative risk assessment of environmental health risks, and evidence assessment.

Address:

Holger Schütz

Research Centre Jülich

Programme Group MUT

D - 52425 Jülich

Germany

Phone: + 49 2461 61 3595

Fax : + 49 2461 61 8175

Email: h.schuetz@fz-juelich.de

7. German-Japanese Forum on Risk Management and Communication about Mobile EMF

C. Pözl, Federal Office for Radiation Protection

Relevant regulatory bodies

- Within the government the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU, www.bmu.de) is responsible for the protection of the public against electromagnetic fields. Its subordinate federal authority, the Federal Office for Radiation Protection (BfS, www.bfs.de) deals with risk assessment, public information, research programmes and preparation of reports.
- The German Commission on Radiation Safety SSK is counselling the BMU on questions of radiation protection. It consists of a permanent committee and several committees appointed for specific tasks. One committee is responsible for non ionizing radiation.
- The Regulation Authority for Telecommunication and Post (RegTP, www.regtp.de) is a subordinate federal authority of the Federal Ministry of Economics and Labour. The RegTP is responsible e.g. for the allocation of frequencies and questions of compliance of high frequency emitters with the limit values. It also runs regular measurement campaigns.

Setting policies

- Since 1996 the "26th Ordinance Implementing the Federal Immission Control Act (26. BImSchV)" regulates the erection and operation of stationary radiofrequency installations (with a transmission power of 10 W EIRP or more). The ordinance covers the frequency range of 10 MHz to 300 GHz and follows the ICNIRP recommendation. A second ordinance regulates procedures of recording and demonstrating compliance with the RF exposure limits for stationary installations (BEMFV, 2002).
- In December 2001 the Mobile phone operators entered into a "Self-commitment towards the Federal Government". The self-commitment aims at strengthening precautionary aspects. Main objectives are:
 - improved information of and collaboration with the local authorities
 - site-sharing for mobile phone base stations
 - near of schools and kindergartens the consideration of alternative sites
 - improvement of consumer protection
 - mobile phone labelling and
 - the financial support of a research programme.

As part of the self-commitment an annual report about its translation into action is requested. It is commissioned by the IZMF, the "Mobile Telecommunication Information Centre" (see below). Up to now three reports have been published for the years 2002, 2003 and 2004. The report for 2004 was published in March 2005. The reports contain results of surveys carried out with the local authorities, the audit of the operators' information strategies as well as specific recommendations for the further process optimisation.

- The "Agreement over the exchange of information and the participation of the municipalities in the local roll out of the mobile telecommunication network" was made between the mobile telecommunications operators and the central municipal associations, July 2001. The contents of this agreement are included in the above mentioned self-commitment.
- Voluntary agreements between the mobile telecommunication operators and local governments were formed in several cities and federal states. Examples are the agreements on mobile telecommunication in Bavaria (first edition in 1999, second edition in 2002) and North Rhine Westphalia (2003). Both agreements aim at regulating the further development of the mobile telecommunication network in coordination between the local authorities and the operators. Those agreements are quite similar to the self-commitment of December, 6, 2001.
- Local concepts for the supply with mobile telecommunication services (siting of base stations) were developed in several German cities.
- In 2002 the Jury "Environmental Labels" has developed a basic criteria document for low exposure mobile phones. Phones with a specific absorption rate below 0,6 W/kg and other environmentally relevant specifications could apply for a label ("radiation reduced"). The industry in Germany frequently takes advantage of this label in other areas (mainly chemicals) increasing thereby the competitive market potential for their products. In this case, however, no mobile phone company has applied for the label so far.

Dealing with public concern

- The German Mobile Telecommunication Research Programme (DMF; <http://www.deutsches-mobilfunk-forschungsprogramm.de>) has been initiated by the Federal Office for Radiation Protection (BfS) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The total costs of 17 million € are equally shared between the German Government and the mobile telecommunication operators. 52 research projects in the fields of biology, epidemiology, dosimetry and risk communication are carried out between 2002 and 2006. The projects have been designed based on recommendations of national and international expert groups, several workshops and a public consultation process.
One emphasis within the research programme is the research for optimising risk communication with the general public. In this context several surveys are carried out, e.g. an annual survey on the fears and the perception of the general public in the field of mobile telecommunication. Thus changes in concern and developments in perception and the way people are dealing with the mobile telecommunication topic can be observed over the years. Moreover target group specific needs for information and the group specific confidence in information sources and authors is investigated. Additionally, the possible methods of conflict mediation concerning the siting of mobile phone base stations will be discussed.
- In 1999 the Federal Environment Ministry (BMU) set up (organised) a "Citizen forum on electrosmog" with the possibility to chat with the Environment Minister and take part at discussions about mobile phone technology features.
- In 2001 the "Manual for handling problems regarding high frequency electromagnetic fields in cities" was published (second edition). The manual was commissioned by the

Federal Environment Ministry. Main aspects are the dialogue with the public, the scientific assessment and evaluation, and the legal situation.

- Measuring campaigns were carried out by the Federal Regulation Authority and in several federal states, commissioned by the corresponding local ministries. In addition to that, actions were taken to communicate these measuring outcomes to the public.
- The Bavarian Ministry supported the development of a personal RF-dosimeter, which has been tested and compared with the French in a pilot field study.

Providing information

- Information provided by the BfS:
BfS is publishing several press releases and a large number of information material about the technology, and possible biological effects and/or adverse health effects of high frequency electromagnetic fields. Information about all aspects concerning mobile telecommunication can be looked up on the BfS-website. Employees of the BfS are present at citizen's meetings, information meetings, several fairs for different target groups, as for example the German Trade Fair for Education and Training, or the "Open Day" of the Federal Environment Ministry, etc, in order to establish the contact and communication with the general public. In this way concern and information demand of the general public can be perceived and the transparency in the field of mobile telecommunication can be improved.

For the adequate communication of the goals and results of the German Mobile Telecommunication Research Programme a website has been developed. Moreover BfS is carrying out scientific colloquia and discussions with experts. The results are published on the DMF website.

- To ensure the transparency of the research programme (DMF) and the optimal communication of the research aims and results a "Round Table German Mobile Telecommunication Research Programme" was established. Its aim is to accompany the research programme as an independent consulting and discussion committee and to give stake holders and institutions (representatives of science, authorities and interest groups) the possibility of in depth information the programme.
- in 2001 the "Mobile Telecommunication Information Centre" (IZMF) was established at the initiative and with the support of the mobile telecommunications operators. The IZMF functions as a service provider in the field of information about mobile telecommunication, health and society. It is directed at the general public, media and other institutions.
- Several public and private institutions, interest groups and other actors dealing with the topic "mobile telecommunication and possible health effects" provide websites and information material (e.g. flyers, brochures, etc.) with descriptions and discussions about different aspects: from the basic technical principles of mobile telecommunication, over possible biological and adverse health effects up to the discussion about base station sites. Also several local and regional authorities developed specific mobile telecommunication information material and websites.
- Register of / Database on base station sites provided by the Federal Regulation Authority for Telecommunication and Post. It can be looked up for specific information about base station sites and their technical features. Access is possible for

the general public, with a special account including further information for local authorities.

About the author

Christiane Pözl

Studies of Sociology in Regensburg 1993 to 1999.

Diploma in Sociology.

Consultant market research at NFO Infratest (today: TNS Infratest) in the IT / Telecommunication sector till 2002

Scientific associate at the Federal Office for Radiation Protection (BfS) since 2002; responsible for risk communication within the Working Group Non-ionizing Radiation (AG NIR).

8. Risk management and communication about Mobile EMF in Japan

Dr. Chiyoji Ohkubo, World Health Organization

Background

Since the establishment of mobile telephone networks there has been public concern in many countries about possible health consequences from exposure to the radiofrequency (RF) electromagnetic fields (EMF) emitted from mobile phones and their base stations used for communicating with mobile phones within these networks. RF-EMF emissions from mobile telephone and their base stations have been suggested as causing cancer and many symptoms such as sleeplessness, eye problems and headaches.

Many people in Japan are also concerned about mobile phone and their base stations. Because of rapid increase of mobile phone subscribers, each telephone operators are increasing the investment for mobile phone base stations. From the legal point of view, once operators secure the construction site, they can start construction. However, some people are against the construction, claiming that the RF-EMF emitted from base stations will cause cancer, or harmful to the health of children. Such movement are nationwide.

Regarding the human exposure to RF-EMF, many research results have been accumulated for more than half a century. It is an established fact that very strong RF-EMF can cause thermal effect, and some low frequency EMF might cause stimulating effect. Threshold level that causes such effects has been studied. Based on such studies, Radio Radiation Protection Guidelines were established in Japan in international forum. The most world widely adopted RF-EMF exposure guidelines are those developed by the ICNIRP (International Commission on Non-Ionization Radiation Protection). ICNIRP has published guidelines on exposure limits for the whole EMF part of the spectrum in 1998. Exposure guidelines in the RF-EMF range are based on preventing adverse health effects due to excessive heating of the body. Exposure limits for workers and for the general public are set well below levels where any hazardous heating occurs from microwave exposure. On the basis of the results obtained, exposure levels from mobile phones and their base stations that comply with the international limits are not considered hazardous.

Ministry of Internal Affairs and Communications (MIC, former Ministry of Posts and Telecommunication) issued Radio Radiation Protection Guidelines. The basic policy is that MIC adopts guidelines which are consistent with ICNIRP guidelines. The guidelines have two structures; one is Basic Guidelines which are used to evaluate the safety of RF-EMF to which people are exposed on various effects, such as rise in temperature in the inner body, an electric shock. In order to evaluate Basic Guidelines, Administrative Guidelines are developed. The guidelines composed of two parts; electromagnetic field strength guidelines, which are applicable for radiation for far field. Radiation from mobile phone base stations and broadcasting stations are applicable. This guidelines use measurable parameters such as electrical field strength, magnetic field strength, and power flux density. The other one is the partial body absorption guidelines which are used for the case that RF-EMF emission occurs very near to human body such as mobile phones.

EMF regulations

Radio Radiation Protection Guidelines are adopted at Telecommunication Technology Council at 1990 for the first time, the guidelines include for fixed station, and hence it is defined as field strength and power flux density. Partial Absorption guidelines were adopted in 1997; it is defines SAR (Specific Absorption Rate).

In order to legislate or mandating this kind of regulation, it is necessary to identify its measurement and evaluation method. Without unified measurement system, it is difficult to evaluate fairly. As for the RF-EMF evaluation, conformity evaluation method were developed in 1998, based on this methods, MIC revised relevant rules in 1998 and enforced in 1999. As for the partial absorption guidelines, MIC mandated SAR measurement from 2002. Electrical field strength guidelines for general environment are the values consistent with ICNIRP guidelines.

The guidelines are composed as three elements; electrical field strength, magnetic field strength, and power flux density. Those values are for averaging at 6 minutes. The partial body absorption guidelines apply to radio device used in close proximity to the body such as mobile phones. There are two SARs, one is whole body SAR, the other is partial body SAR. In the case for mobile phone, partial body SAR is applied.

The guidelines have two-stage structure. They are divided into Controlled Environment for occupational conditions and General Environment for general public. Controlled Environment is an environment under which radio-radiation exposure can be controlled based on the radio-radiation protection guidelines. Under such conditions, EMF from radio use are well recognized, the people to be protected can be identified, and the necessary measures such as warnings can be taken. Relevant environment is for example, a working area near a broadcasting transmission tower or industrial facilities emitting radio wave. General environment is an environment under which radio radiation cannot be recognized or controlled. A relevant environment is, for example, a residential area.

Exposure limits are stricter in the general environment than in the controlled environment. The safe factor for Controlled Environment is set about 5 times as large as that for General Environment in terms of power density, considering the uncertainty as a result of insufficient control of the EMF under General Environment.

Relevant rules of Radio Law were revised so that radio station licensees are obliged not physically allow persons other than radio station maintenance personnel to enter places where electromagnetic field strength exceeds limit values. Therefore if the EMF strength is enough strong, a safety measures such as building fence is required. The rules define the waiver as follows.

- Radio facilities that transmit power of less than 20mW
- Mobile radio facilities
- Temporarily installed radio facilities in case of emergency or disaster

SAR limits for portable phone terminal

The measure to evaluate portable phone's safety is SAR. As portable phone is used to the proximity of ear, only partial body SAR is applied. At this moment, there are two values for partial body SAR. WHO ICNIRP stipulates 2W/kg per any 10g units; EU adopted this value. Japan followed this value. While in the US, IEEE adopted 1.6W/kg per any 1g units. Canada and Australia adopted this value.

Although some country such as USA already adopted SAR regulation in the rule, and ask the manufactures to submit the SAR data, standardization SAR evaluation has not finished. Due to the rise of SAR concern in public, it was urgent to standardize SAR measurement method. Without standardization, it is impossible to compare and evaluate different SAR value submitted from manufactures. In the North America, IEEE-SCC34 subcommittee-2 worked hard towards standardization, while in Europe, CENELEC worked. Both organizations were closely studying together. Both organizations finalized draft of the standard. Japanese manufactures were participating to the work of both organizations.

SAR evaluation methods are prepared by ARIB (Association of Radio Industries and Businesses) as a voluntary standard, it shows several alternatives. Because of rising concern on radio wave safety, and the international trends of standardization, MIC consulted Telecommunication Technology Council about standardization of SAR. The committee released Japanese standard, which is consistent with IEEE and CENELEC method.

With this result of the council, MIC revised relevant laws to regulate SAR from cellular phones. Under existing regulations, portable phones are subject to certification, a kind of type approval before entry into market. SAR measurement is added as a requirement of certification. New regulation has been in force from 2002.

Study on human exposure to RF-EMF

Committee of the study on human exposure to RF-EMF was established in 1997. Its purpose is to scientifically clarify the effect of radio waves from mobile telephone terminal and its base stations to human body. The research topics are internationally coordinate with WHO RF-EMF Research Priority. The member consists of 20 members from experts in relevant field such as technology, biology and medicine, manufactures and operators. MIC is financing this committee and gives financial assistance to the research of the members.

One of such animal experiments, the group confirmed that the impact causing the disorder of Blood-Brain Barriers could not be in radio frequency exposure over a period of one month at strength which does not cause thermal effects. Several experiments are going on; one of them is long-term exposure study using rats for two years which is equivalent to the life span of rats. The other is epidemiological study; or in other word, case controlled study on mobile phone use and brain tumor, this study is one of the INTERPHONE STUDY coordinated by IARC (International Agency for Research on Cancer). This kind of study should be carefully evaluated by international harmonization being conducted by WHO.

Human hazard issue of EMF should be conducted by international coordination and cooperation. Between Japan and Korea, we have been holding annual meeting since 1997. We have also exchanged information and promoted further cooperation among other countries including EC members, COST 281 experts and USA governmental officials (FCC) and IEEE experts.

Risk communication about mobile phone EMF

When the government first allowed establishment of mobile phone networks, health effects of mobile phones and their base stations were not recognized so seriously. Government required operators to establish their networks as quickly as possible and so

allowed base stations to be erected following engineering requirements, and in many cases without the need for local government planning permission or public input. Public information about the new networks was sparse or absent. In general operators did not take into account public concerns when siting base stations.

However, public concerns associated with mobile phones and its base stations are increasing continuously year by year. Backgrounds of the public concerns are mainly caused by increases in mobile phone users, especially by children and base stations in neighborhood, and lack of scientific knowledge of EMF. Activities of people concern are surveys on domestic and foreign situation on EMF with inputs from “experts”, request to operators of explanatory meetings before base station construction, inquiries to government and operators on safety concerns, petition to government, and communication through leaflets issued regularly and networking of activities. They criticize government and operators’ approach to the EMF issues.

MIC has been subjected risk communication relating mobile EMF and its possible health effects for providing scientific information to public. Efforts for risk communication are press release on research by the Committee, publication of pamphlets and booklets to provide general information on EMF exposure to general public, local authorities, etc, organizing seminars and lectures to brief the latest information from experts, provide information from web site, and individual counseling.

Conclusion

There is no scientific evidence that adverse health effects can occur in people exposed to levels at below the limits by Radio Radiation Protection Guidelines. The guidelines are based on the generally accepted international guidelines issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP, 1998). Furthermore, because these issues should involve human health, MIC continues to promote researches of RF-EMF exposure effects on humans as well as to promote risk communication about mobile phones and their base stations.

About the author

Name in Full: Chiyoji OHKUBO

Date of Birth: 26 January, 1945

Nationality: Japanese

Affiliation: Radiation and Environmental Health, WHO (April, 2005 - present)

Education Background:

PhD. from University of Showa, School of Medicine (February, 1982)

B. Pharm. from Tokyo University of Pharmacy and Life Sciences(March, 1968)

Professional Career:

• **Job Title**

Staff of WHO International EMF Project, Radiation and Environmental Health, WHO (April, 2005 - present)

Director, Department of Environmental Health(April, 2002 – March, 2005)

Director, Department of Radiation Hygiene and Department of Community Environmental Sciences (April, 2001- March, 2002)

Professor, National Institute of Public Health (May, 1990 - March, 2005)

Director, Department of Physiological Hygiene (April, 1990 – March, 2002)

• **Study Abroad Careers**

Visiting senior research fellow, Department of Radiation Oncology, MGH, Harvard Medical School, Boston, MA, USA (1992)

Post-doctoral research fellow, Department of Bioengineering, Carnegie Mellon University, Pittsburgh, PA, USA (1989)

Visiting research fellow, Department of Pharmacology, Melbourne University, Victoria, Australia (1980)

• **Activities in Academic Society**

Director, Japanese Research Association of Health, Fitness and Nutrition (2002-present)

Director, Japanese Society for Microcirculation (1999-present)

Director, Association of Research on Healthy City (1999-present)

Director, Japanese Society of Biorheology (1987-present)

• **Other Appointments**

International Advisory Committee Member, the WHO International EMF Project(1996-present)

Chairman, The Committee of Risk Communication on Power Frequency EMF and Health, The Agency of National Resources and Energy, Ministry of Economy, Trade and Industry(1998-present)

Vice Chairman, The Committee to Promote Research on the Possible Biological Effects of Electromagnetic Fields, Ministry of Internal Affairs and Communication(1997-present)

Research Field:

Physiology and Pathophysiology of Microcirculation, Biological Effects of EMF and Public Health

Papers, Books, etc. presented or published by my name:

Original Papers : 42 articles written in English and 31 articles written in Japanese

Books: 56

Reviews and Reports:69
Presentation: 270

Date: 6 May, 2005

Signature

A handwritten signature in black ink, appearing to be 'S. H. H. H.', written on a light-colored background.

9. Risk Management and Communication: A Review of International Differences

Tamsin Greulich and Dr. Ray Kemp, Galson Sciences Ltd

Introduction

Public anxiety about possible health risks from Electromagnetic Fields (EMF) from mobile telecommunications has grown at different rates and with varying degrees of intensity in countries around the world. Whilst there may be differences in the nature of the concerns and the way in which they are expressed from country to country, there tend to be unifying factors underlying such concerns that are similar across the globe. With mobile telecommunications industries increasingly working together globally to create effective risk communications approaches on this issue, governments and regulators arguably lag behind in this knowledge sharing approach. In response to this, pressure groups are also communicating effectively across international boundaries and researching global experiences to maximise the potential impact of their campaigns.

The following overview suggests that to be as effective as possible, all parties to the issue need to develop a greater joint awareness of the role of effective risk communication. From a practical perspective, the approach to risk communication for EMF should be tailored to suit local area stakeholder needs as well as incorporating best practice from elsewhere in the world.



Mobile EMF Risk Communications Guidance

There is an increasing body of support available recognising the value of risk communication regarding mobile EMF. Internationally, for example, the World Health Organisation (WHO) has produced guidance for decision-makers “*Establishing a Dialogue on Risks from Electromagnetic Fields*” (image, left)¹ which aims to provide local government officials with support when “faced with a combination of public controversy, scientific uncertainty, and the need to operate existing facilities and/or the requirement to site new facilities appropriately”. At a national and industry level

additional guidance has been developed, providing practical advice on risk communication with stakeholders during the deployment process. Both UK² and Australian³ industry bodies, in collaboration with member operators, have published risk communications handbooks to support their own staff and to aim for greater consistency in risk communication and stakeholder engagement approaches.

Anecdotal experience in the UK, and elsewhere, suggests that prior to the widespread and highly publicised sense of public concern over the issue, communications about mobile EMF were largely restricted to information provision regarding the way that networks and handsets operate. Arguably there had been a greater general sense of trust with

towards the industry at the time, so that such information was generally accepted. As concerns have grown among the general public and special interest groups, and with heightened media and political interest, that sense of trust has certainly diminished, and the main aim of current communications on the issue is to rebuild trust with these stakeholders and establish a sense of credibility. It is no longer sufficient to simply provide technical and factual responses to public queries. All stakeholders – industry, regulators, policy makers, academics, consumers and communities – have had to adapt to changing perceptions towards mobile EMF.

Background to the Development of the EMF Issue: UK & Europe

The growth rate of the mobile telecoms sector has been rapid in countries throughout the world. Several EU states in Western Europe have mobile phone ownership rates of 100% or more, including the UK, Sweden, Portugal, and Luxembourg. Whilst in Eastern Europe fixed line subscriptions are falling as a result of easier access to mobile technology. The Czech Republic, Greece and Slovenia have mobile penetration rates higher than most Western European states, while in Russia the mobile market is currently exploding with growth rates of nearly 100%⁴.

At its height, between 1999 and 2000, the UK mobile telecoms sector was accommodating 46,000 new subscribers to its networks every day⁵. Of course with this growth came the need for extra base stations to meet the rising demands. At present there are approximately 45,000 base stations in the UK. While the public have been quick to get to grips with using the technology, the level of understanding about how the technology works, and the EMF issue, has not improved. Rapid expansion of the networks, coupled with a generally low sense of public understanding of the background to the technology, understandably resulted in a sense of unease among communities living around base station sites, fuelled in part by a growing media spotlight.

The response to increasing public concerns in the UK was for the Government to commission an Independent Expert Group on Mobile Phones, commonly known as the Stewart Group, to investigate the issue, while the operators initially adopted a fairly defensive position, confirming their compliance with all relevant planning and health & safety regulations. By 2000 the Stewart Group had reviewed a wide range of both substantiated and unsubstantiated evidence, and had interviewed a variety of stakeholders, including concerned members of the public and campaigners. The Stewart Group published their findings in May 2000, and the Stewart Report⁶ came to represent a global reference point to the issue. The report concluded that while there was no conclusive evidence of a risk to health from mobile EMF, gaps in the knowledge were sufficient to justify a precautionary approach to the use and development of the technology.

We believe “precautionary” to be an “essentially contested concept” by which we mean that it is a value-laden concept that will be interpreted in very different ways by different people under different circumstances. For the regulator, “precautionary” means balance the risks and benefits and continuously review the science and appropriate regulatory standards; for the concerned parent, “precautionary” means “zero risk” - do not allow any exposure to the hazard. The conclusions of the Stewart and subsequent reports of the UK

National Radiological Protection Board were therefore interpreted in different ways according to the perspective of the reader, and it could be argued that the lack of a definitive or bold answer to the question “how safe is this?” in fact heightened such concerns further. “How safe is safe enough?” has become “how precautionary is precautionary enough?” – making the role of risk communication much more complex.

Whilst the Government set about implementing a number of the Stewart Report’s recommendations, the industry responded to the Stewart Report and public concerns by developing a voluntary set of 10 Commitments. The 10 Commitments are based on a ‘middle ground’ approach to addressing concerns about health and safety, and aim to achieve better siting practice through improved transparency, communication, consultation, and site sharing. The introduction of the 10 Commitments has helped to ensure that communities are not overlooked in considerations about siting proposals, and promotes a more consistent approach to site-specific decision making across industry.

The “middle ground” approach supports research, adopting a neutral position to scientific outcomes. It promotes information sharing, encouraging two way communication and stakeholder dialogue, and pursuing solution driven policies rather than conflict based strategies, with the overarching objective of building social trust. This contrasts with the more defensive “denial” approach which restricts debate about uncertain health issues to only proven scientific outcomes, relies on research outcomes being negative, fails to acknowledge risk perception, polarises stakeholder positions and ultimately promotes litigation.

A complication factor for a global industry is that European guidance has been developed for European Union Member States, but individual States apply the guidance in different ways. The International Commission on Non Ionising Radiation Protection (ICNIRP) guidelines have been broadly adopted across many European States. However in some countries, notably Italy and Switzerland, these health-based reference levels have been tightened so that EMF emissions are as low as possible. There are differing interpretations of a “precautionary approach” across Europe in relation to the regulation of mobile EMF and voluntary codes of practice, though many countries have adopted approaches similar to the UK’s, following their own national reviews of the evidence base.

Background to the Development of the EMF Issue: Australia

In Australia, where the mobile penetration rate in 2004 was approximately 80%, the mobile telecoms sector continues to see significant growth rates. As elsewhere, this has been accompanied by growing publicly voiced concerns, predominantly about mobile EMF. The Australian response to increasing public concerns about base station siting has been based on risk governance and deliberative stakeholder engagement. In 2002, the Australian Communications Industry Forum (ACIF) developed an Industry Code⁷ for network deployment. The Code was developed with the aim of addressing community concerns about the risks of mobile EMF exposure by creating opportunities for communities and councils to have greater participation in decisions made by Carriers on site specific proposals. The Code is designed to supplement the existing regulatory

regime at local, State and Federal level, by requiring Carriers to consult with the local community and to adopt a precautionary approach in planning, installing and operating radiocommunications infrastructure. The Code places mandatory requirements on all Carriers to design and operate radiocommunications infrastructure to minimise mobile EMF exposure, and to ensure that improved opportunities for stakeholder notification and consultation are created.

An underlying principle of the ACIF Industry Code is that as public health and safety is of paramount importance, the adoption of a precautionary approach in the deployment of radiocommunications infrastructure is therefore appropriate. In the context of the Code, the precautionary approach has been taken to mean that steps are taken to minimise exposure to mobile EMF emissions due to concerns over a possible association with health problems so that people are protected, even though EMF emissions at such low levels have not been proven to cause such problems.

Global Guidance on Precaution

The range of interpretations of what constitutes a precautionary approach and when it should be applied has led to increasing levels of debate on the matter. The current level of apparent ambiguity and lack of definitive guidance has been argued to contribute to public feelings of concern over scientifically uncertain issues. Where precautionary approaches are applied without evidence of risks to health or the environment, it can be interpreted as an acceptance that public concerns are scientifically justified. This ongoing debate has led the WHO to consider the development of a Precautionary Framework on EMF. The framework is currently in draft format, but will aim to provide guidance in areas of scientific uncertainty⁸. The WHO intends to present this framework to the highest levels, with the aim of providing clear guidance to Member States in the development of public health policies and the application of precautionary approaches. The framework has recently been extended to include generic case studies on EMF, including mobile EMF, and expands the scope of factors to be considered from solely science based assessments to incorporate social, political and public health concerns, such as consideration of vulnerable populations, concerns for the unborn child, and quality of life issues.

However, the WHO framework will not provide a mechanical formula for the application and development of precautionary approaches. Rather the framework will aim to offer a process for clarifying and analysing during decision making, so that options selected provide the best outcome for society, based on a careful balance of health protection and cost. The framework ultimately hopes to achieve outcomes of better health protection, broader stakeholder participation, and improved public acceptance, but without being prescriptive it may fail to meet the demands of concerned members of the public seeking certainty in protection against possible risks.

Community Responses to the Mobile EMF Issue

Arguably, community responses to the growing mobile EMF issue have been no less organised than approaches adopted by industry or regulators. In the UK, local protest groups are able to gain guidance and support from several nationally facing, well

networked, campaign organisations. Mast Action UK (MAUK) is a voluntary organisation that grew from a single base station development that appeared in the grounds of a school. A local campaign developed and through an extensive information gathering process and a growing realisation that these local campaigners were not alone, the group developed into a nationwide network of protest groups, working together to share information and helping one another to achieve local aims. MAUK soon achieved a more professional semblance through an official launch at the House of Commons in December 2000, and currently operates with the support of Friends of the Earth, guided by technical, legal and financial voluntary advisors.

Similarly Mast Sanity was established in the north of England, and since 2002 has been networking nationally and internationally to lobby for greater public awareness of the mobile EMF issue. Mast Sanity provides web links to a range of international campaigners, and information is actively shared between global counterparts. Mast Sanity has an Australian sister organisation, Tower Sanity, that was actively involved in commenting on the development of the ACIF code, signifying not only how successfully campaign groups have worked to get themselves taken more seriously by decision making bodies, but also indicating the effectiveness with which their campaigns can operate. Mast Sanity provides opportunities to translate campaign materials into other languages, to further improve accessibility to global information and smooth the knowledge flow, and offers direct introductions to global campaigners.

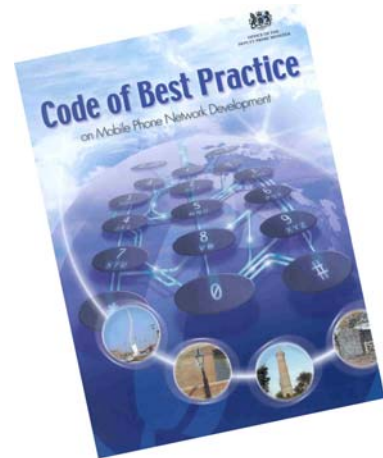
Campaigners at a global level have demonstrated that they are quick to act on new developments, and due to their less bureaucratic approaches, this is often more rapid than industry or regulatory responses. They can also be quicker to disseminate new information to a wide audience, maximising opportunities to highlight new issues to the media, and hence leaving industry or regulatory spokespersons in a responsive rather than proactive position.

Process changes to network deployment: UK Response

In response to the Stewart Report (2000) the UK Operators committed to:

“Develop, with other stakeholders, clear standards and procedures to deliver significantly improved consultation with local communities”

- the first of their 10 Commitments. This is a self-regulation initiative, supported by a series of national stakeholder roundtables and local dialogue to promote scrutiny and continual self improvement. However, self regulation by a trusted organisation is different to self regulation by an organisation that is distrusted, and hence the primary aim of industry communications continues to focus on building trust. To support this, the Mobile Operators Association commissioned independent assessments of operators’ performance against the 10 Commitments, which were undertaken by Deloitte & Touche. These independent assessments suggested that progress is being made by the operators in consulting



communities and developing site-specific consultation plans. However the reviews did also recommend the need for further improvement.

Following development of the 10 Commitments, industry worked in partnership with central government and local government to develop a Tripartite Code of Best Practice, (image, right) published in 2002⁹. The Code aims to provide unambiguous and practical guidance on communication and consultation over base station siting, and to promote a standardised approach on network rollout. The Code incorporates the 10 Commitments and the industry “Traffic Light Model”, which is used by operators to guide the development of consultation plans for each site proposal.

Operators’ Agents assess the relative sensitivity of a radio base station site option according to the “Traffic Light Model”, which rates a site according to a range of environmental / planning factors, such as visual impact and development plan policies, and community factors such as previous resident campaign activity and council telecommunications policy. This aims to ensure that potentially significant local issues are not overlooked in considering a proposal. The model allows a sensitivity rating to be produced for the proposed site, which will indicate the level of consultation deemed necessary prior to reaching a decision on how to proceed with the proposal. According to the sensitivity assessment, some consultation approaches are required, others are optional, and might include written correspondence with community representatives or surrounding properties, in advance of any formal application, or briefing sessions and “drop-in” meetings. Associated with this more structured approach to ensuring that communities and other stakeholders are involved in the decision making process, overall there has been an increasing emphasis on transparency through access to emissions data and verification studies.

It is important to note that while the Ten Commitments and the implementation of Traffic Light Model site sensitivity ratings are initiatives that are self-regulated by the industry, the operators have to work within a regulatory framework. What is often overlooked is the fact that the UK approach to network deployment includes a commitment to prior consultation – that is consultation even in advance of a formal planning application or proposal notification being submitted. No other industry follows this type of procedure for its routine development programmes and the statutory procedures that might otherwise be followed are far less transparent and consultative.

Process changes to network deployment: Australian Response

In Australia, growing public concerns have been responded to through the development of the ACIF Code, which was created in partnership with representatives from community and campaign groups, mobile phone carriers, union bodies, and local government. The Code was developed by the ACIF, which is the key industry body responsible for standards and code development, and was registered with the Australian Communications Authority (ACA), making the requirements of the Code mandatory for carriers. The intention was that the Code would increase the transparency and accountability of carriers, and increase the amount of community and other stakeholder consultation undertaken when mobile phone base stations are built. It aims to build

community and stakeholder engagement into the deployment process, and to address community concerns about the design, operation and selection of sites for communications facilities before finalising decision making.

The ACIF Code represents the industry's precautionary approach to site selection and design, incorporating requirements for community consultation and/ or notification about radio base station proposals, as well as improved transparency, for example through the provision of site specific EMF information. A range of support tools have been developed both to aid carriers in adopting a more consistent cross-industry approach to communication and consultation, and to facilitate greater access to data for interested members of the public.

To facilitate implementation of the Code, an amended version of the UK Traffic Light Model was developed, featuring extra levels of sensitivity rating to better tailor consultation activity to suit individual proposals and circumstances. The model allows potential radio base station sites to be rated according to their sensitivity in terms of planning/ environmental factors, and community issues. For Green rated sites it is suggested that only the basic notification requirements set out under the ACIF Code will be necessary, as likely community and environmental and/ or planning concerns are considered to be low. For Amber and Red rated sites it is expected that there may be a greater level of concern or site sensitivity, and hence increased levels of stakeholder dialogue and community consultation are recommended. However, where a site is rated Red or Amber predominantly as a result of community-related sensitivity, an extra level of engagement is recommended, above that required for Red or Amber rated sites based largely on planning factors. This approach recognises the importance of community dialogue, and of addressing stakeholder issues as a fundamental part of the decision making process.

Having rated a site and developed a community consultation plan, the local council is then invited to approve the consultation plan. The council has five working days to comment on the plan, though can request additional time (up to another five business days). This required council input to the consultation plan aims to ensure that no relevant local stakeholders will be overlooked during the consultation phase. Once the consultation plan is implemented the council then has the opportunity to comment on the proposal itself. To support councils in understanding and realising their own roles within the Code, as well as carriers' responsibilities, the industry body has been conducting a council contact programme involving State Local Government Associations and hence all local councils nationally.

It is important with any structured risk communications approach implemented across a diverse range of organisations, to ensure that the tools and commitments are embedded in awareness and skills training, with ongoing support. This ensures that risk communication approaches are applied consistently, with intelligent flexibility, by staff who understand why the approach has been adopted. In Australia the carriers have introduced the Code alongside training in risk communication techniques and a support

handbook for staff. There is also a process for ongoing feedback, learning and improvement within the industry.

Concerns have been expressed by some Australian campaign groups that the carriers see the ACIF Code as a license to self-regulate. As with the UK voluntary commitments, which were formalised through the government Code of Best Practice, the ACIF Code sits within an existing regulatory framework. The ACA has powers to take enforcement action against carriers breaching the Code, the requirements of which are mandatory. Self-regulation does not imply freedom to act without justification, but rather aims to drive up standards through voluntary commitments, with external scrutiny and powers to address breaches, and purposefully set within legally binding obligations.

International Knowledge Sharing

At a global level knowledge and experiences are being shared through various stakeholder networks. Campaigners are maximising their potential impacts through combined forces. Mast Sanity urges groups to work together, and encourages citizens to get involved at every level with a powerful message:

“You may win your battle but unless we all come together we will not win this war”¹⁰.

Internationally industry bodies are also learning from one another, through global conferences and discussion forums, as well as direct networking. The UK industry Traffic Light Model and handbook on risk communication were used to inform the development of Australian versions, while in return the Australian visualisation RF software, used to provide graphically visual data for stakeholders on RF emissions from base stations, has been effectively used to help in communicating with communities on site specific proposals in the UK.

Without the constraint of potential commercial rivalry, campaign groups are often quicker to share information and to open it up to public scrutiny than industry competitors might be. For example, in Australia a locally formed protest group, the Oatley Park Defenders, established to campaign against an initial proposal to install a 21 metre high 3G structure in locally cherished parkland, maintained an online news update via their website. Once their own campaign had been resolved, following a High Court decision to remove the installed structure, the group closed down but kept the information publicly accessible online, to help other groups into the future to learn from their experience.

In the UK network operators quickly realised that no competitive advantage is to be gained by working in organisational isolation on risk communication or community engagement activity. The MOA facilitates regular roundtables and working groups for members to consider mutual approaches on sensitive issues, as well as wider stakeholder roundtables held at national level to consider strategic issues. Council information sessions are held across the country, allowing operators and the MOA to discuss locally pertinent issues together with local decision makers. At a global level, operators with an international presence are increasingly looking at approaches and experiences in other

branches of their multi-national organisation to determine if any lessons might be learned, and applied to the culture of their own company and society.

Implications

The world is changing, and trust of scientific information is at an all-time low amongst many communities. All mobile phone companies - in the UK and internationally - have run into problems and are facing increasing challenges over the EMF issue. Regulators and local governments are also being challenged. The decision-making stakeholders recognise that the ability to communicate effectively about environment and health issues in general, and EMF in particular, is more important than ever, and that information communicated should not focus on facts and figures. Consumer education by providing more numbers is not the answer where trust and credibility are actively challenged. It is essential to generate a degree of trust in your organisation as a competent and reliable source of information and advice, and this requires public involvement, skill, and training. The “decide-announce-defend” attitude adopted by some industries in the past is no longer viable. Although it can become onerous for communities to be consulted on one development proposal after another, whilst trust is eroded the public will continue to demand the opportunity to exercise that right. This will continue at least until such a position is reached whereby the public trusts the “experts” to make the right decision with or without public and stakeholder inputs.

Conclusion

The mobile EMF issue has been linked with rapid growth in levels of community concern, and is associated with fundamental outrage triggers¹¹: EMF emissions can't be seen; they are under someone else's control; they affect everyone - young and old alike; exposure to EMF emissions are not geographically equal across communities; scientists have been proven wrong before. Furthermore, the EMF issue is often amplified by newspaper, TV and radio coverage where “human interest” stories encourage editorial licence.

Major steps forward have been made in increasing the transparency and accountability of the mobile phone sector regarding EMF, in the UK and elsewhere. However, a Precautionary Approach to EMF does *not* mean stop development, it means *better governance*, including:

- following established international guidelines
- assessing the alternatives and the proposals carefully
- weighing the risks and benefits
- improving openness in assessment and decisions
- making the data and science research transparent and accessible
- improving consultation with local stakeholders
- researching the issues and monitoring the situation
- applying best practice in risk communication, and training responsible organisations accordingly

From a risk management perspective, it is clear that mobile telecommunications networks have been deployed and considerable societal benefits have accrued. All governments are keen to support an effective telecommunications industry as being central to future

sustainable development. The global telecoms industry has by and large adopted a “middle ground” approach to scientific uncertainties associated with public exposure to EMF – based on sound risk management and risk communication principles and procedures. This approach can be described as “precautionary” in that it supports on-going scientific research, promotes dialogue between stakeholders, and seeks to maintain public exposures to EMF as low as practical within international guidelines.

Some commentators have sought to criticise this “middle ground” approach as ineffective and leading to formulaic risk communication processes. They imply that this is not effective and not cost effective. However, this criticism and the alternatives proposed demonstrate a lack of awareness of the reality of mobile telecoms deployment business and the *real politic* of an industry being regulated where there is considerable scientific debate and uncertainty regarding possible health effects. Where a new technology is responding to public demand with thousands of development sites (masts, antennae, base stations) required, it is essential that risk communication procedures are consistent, transparent and fair. From extensive practical, and international experience on this particular issue, we can say that alternative, more aggressive approaches to responding to public fears and anxieties from a more “Public Relations” type perspective, designed to quell opposition and dismiss their concerns as unfounded, would only serve to escalate the negative public and media reactions. Worse, they hazard significant legal and financial liabilities in a situation where the health risks remain uncertain.

Alternatively, adopting a more passive, “do-nothing” approach would not meet the Corporate Social Responsibilities of the major global telecoms businesses nor the considered advice given to governments by the WHO, ICNIRP and bodies such as the Stewart group, the National Radiological Protection Board, ARPANSA (Australian Radiation Protection and Nuclear Safety Agency) and so on. There would be a considerable slow down in the development and growth of the mobile telecommunications sector. While some commentators might consider this to be a key objective, it is not an appropriate objective from a soundly based risk management and risk communication perspective. Given the challenges that remain, and considering both positive and negative experiences that have occurred to date, we remain convinced that the “middle ground” approach is the correct one.

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About the authors

Tamsin Greulich

Senior Associate Consultant, Galson Sciences Limited, UK

Tamsin Greulich has degrees in Environmental Science from the University of North London (BSc) and Environmental Technology from Imperial College, London (MSc, DIC). She has nine years experience in public communication and consultation, specialising in risk communication.

Tamsin has been actively involved with the development and implementation of stakeholder engagement and risk communication approaches in the mobile telecommunications sector, both in the United Kingdom and in Australia. Tamsin has co-authored two risk communication handbooks to support front line staff in managing public communications in practice.

She has previously worked for UK mobile telecoms operator Orange, managing Community Liaison activity throughout London and the South-East of England, regarding new site acquisitions for 2G and 3G base stations and also in response to issues relating to existing facilities. She has facilitated a great number of public meetings and media briefings on site specific proposals, as well as developing communications materials and consultation plans.

She continues to provide support to the industry on site specific consultation activity as well as providing guidance at a strategic level. She has supported the industry body, the Mobile Operators Association, in engaging stakeholder representatives from a wide range of perspectives in order to foster and facilitate dialogue, through a series of National Stakeholder Roundtables. She has also provided support to front line staff through facilitation of MOA-sponsored discussion forums and through acquisition agent training programmes.

Tamsin has also supported risk communication and stakeholder engagement programmes at UKAEA's Dounreay nuclear site for the previous two years. She has been involved with the consultation activities on: retrievability; the management of active solvents and oils; low-level radioactive waste (LLW) management; the Shaft end state; PFR raffinate immobilisation.

This work has included development and review of stakeholder consultation materials, support for stakeholder workshops (including reporting) and liaison with UKAEA on stakeholder engagement.

Tamsin has expertise in optioneering software that may be used to illustrate BPEO processes to a wide-range of stakeholders.

Tamsin's experience in stakeholder engagement and risk communication covers a broad subject range, including management of community engagement activities for an urban regeneration programme in Tyneside, support to the County Durham and Darlington Local Criminal Justice Board in developing Witness Care Units, and supervision of a Health Education Authority initiative to support locally empowered health-intervention evaluation schemes.

Ray Kemp BA, MSc, PhD, MRTPI

c/o Galson Sciences Limited
5 Grosvenor House
Melton Road, Oakham LE15 6AX
United Kingdom
E-mail: rvk@galson-sciences.co.uk
Tel: +44 (1572) 770649
Fax: +44 (1572) 770650

Ray Kemp is a Past President of the Society for Risk Analysis, Europe, a past councillor of the Society for Risk Analysis, and was Honorary Visiting Professor of Risk Management and Communication at the University of Surrey 1997-2002. At Surrey he undertook research with colleagues on the social amplification of risk for the Health and Safety Executive (HSE). Ray is an advisor to the World Health Organisation in Geneva, and he has also advised the European Commission, Central Government Departments and Local Government in the UK, as well as a wide range of industrial organisations both in the UK and world-wide.

Ray is recognised as one of the few leading European experts in risk communication with applied practical consulting experience on controversial environmental and public health issues. He has specific expertise risk communication for the radioactive waste management and for mobile telecommunications sectors. Ray was appointed to the International Committee on Electromagnetic Safety (ICES) in November 2003.

Dr. Kemp has over 20 years research and consulting experience for controversial projects. He trained as a social scientist (University of York) and then as a town planner at the University of Wales in Cardiff. His PhD examined the role of major public inquiries in the development of nuclear energy. From 1982 to 1988 he was a researcher then lecturer in environmental risk assessment and planning at the University of East Anglia (UEA), Norwich. While at UEA he established the World Health Organisation (WHO) Collaborating Centre on Risk Communication. In 1989 he joined Dames & Moore (D&M), and became head of D&M's environmental management group in the UK. In 1999 he joined Galson Sciences Ltd to form the risk management group.

Dr. Kemp provides strategic and applied practical advice on risk perception and risk communication for controversial environmental issues. This includes planning and strategy, but also running workshops, preparing communications materials, and training staff dealing with concerned stakeholders.

He has worked as an environmental management consultant in over 20 countries world wide, including across North America, Europe and the Middle East, as well as in Australia, Singapore and Japan. He recently was a member of an international expert panel on public acceptability that was formed by the Belgian radioactive waste management organisation (ONDRAF) to advise on its High-Level Waste Research programme (SAFIR II). Recent clients include the World Health Organisation (WHO),

UKAEA, UK Nirex Ltd, ONDRAF, BNFL Magnox Electric, BNFL, Janus, and DGXII of the European Commission.

He is currently advising the United Kingdom Atomic Energy Authority (UKAEA) on public consultation for the management of solid and liquid LLW and ILW at Dounreay, in Scotland. This involves developing the consultation strategy, communication materials and facilitation of workshops with key stakeholders. He has also been advising BNFL Magnox Electric on Change Management and the development of strategies for management of change from operation to defuelling and decommissioning of nuclear power stations.

Some of Ray's most recent work has been in relation to risk communication regarding the health risks of non-ionising radiation from mobile phone base stations. He has provided guidance on environmental planning, consultation and professional training in risk communication and public consultation to the mobile phone sector in the UK, Europe and in Australia. He has acted as chairman and independent facilitator of a series of stakeholder roundtable meetings on the mobile phone health issue for the UK Mobile Operators' Association (MOA). He has developed guidance manuals in support of network deployment and community consultation for both the MOA and the Mobile Carriers' Forum (MCF) in Australia. Ray is also an advisor to the World Health Organisation in Geneva, chairing an international expert group on risk communication in relation to the health risks of Electro Magnetic Fields (EMF).

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10. MOBILE PHONES AND HEALTH – A UK PERSPECTIVE

Dr. John W Stather, Health Protection Agency

The widespread availability of mobile phones is a recent phenomenon. Their use has escalated over the past decade and to many they are now an essential part of business, commerce and society. There are now over 55 million mobile phones in use in the UK, which is approaching an average of nearly one phone for every person. The phones are supported by about 40 thousand base stations, which provide the link between the mobile phone user and the phone network. An Independent Expert Group on Mobile Phones chaired by Sir William Stewart issued a report on Mobile Phones and Health in May 2000. Subsequently the independent Advisory Group on Non-ionising Radiation published a report on Health Effects of Exposure to RF Fields and a further report from the Board of NRPB (now HPA-RPD) on Mobile Phones and Health 2004 reviewed the response to the recommendations in the Stewart Report and made further recommendations to address remaining public concerns.

This article summarises the evidence on possible health effects reviewed in the UK reports, it also describes the main recommendations in the Stewart Report and the outcome to date.

Introduction

The extensive use of mobile phones in the United Kingdom has been accompanied by a public debate about their possible adverse health effects. Concerns relate to the emissions of radiofrequency (RF) radiation from the phones (the handsets) and from the base stations that receive and transmit the signals and allow communication with the network. Because of the developing concerns through the late 1990s the Public Health Minister of the Department of Health asked the Chairman of the National Radiological Protection Board (NRPB, now the Radiation Protection Division, RPD of the Health Protection Agency, HPA) to set up an Independent Expert Group on Mobile Phones (IEGMP). The remit of the Expert Group was:

to consider present concerns about the possible health effects from the use of mobile phones, base stations and transmitters. To conduct a rigorous assessment of existing research and to give advice based on the present state of knowledge. To make recommendations on further work that should be carried out to improve the basis for sound advice.

The Expert Group first met in September 1999, under the chairmanship of Sir William Stewart. Following 10 meetings of the IEGMP through to April 2000; after hearing evidence from 30 witnesses; listening to public views at 5 open meetings in Liverpool, Edinburgh, London, Cardiff and Belfast; and reviewing many hundreds of scientific

papers and extensive media coverage of the issue, the IEGMP published its report on *Mobiles Phones and Health* in May 2000¹. The Stewart Report is available on www.iegmp.org.uk. Up to the end of April 2005 the site had received more than 2 million hits.

Further to the publication of the Stewart Report the independent Advisory Group on Non-ionising Radiation published a report on “Possible effects on health of exposure to RF fields”² and the Board of NRPB published *Mobile Phones and Health 2004*³ that examined the response to the recommendations in the Stewart Report and how to address remaining public concerns. This paper reviews the main conclusions and recommendations in the Stewart Report and in the subsequent publications.

The Stewart Report

The Report provides information on the interaction of radiofrequency fields with tissues, it examines epidemiological (human health) studies, research on cells in culture, studies on experimental animals as well as on volunteers, and examines the results of research on the use of mobile phones and driving. It also describes the operation of mobile phones and reviews recommendations on exposure standards for RF radiation.

The main conclusions on health effects can be summarised:

- exposure to RF radiation below guidelines does not cause adverse health effects to the general population;
- there is some scientific evidence which suggests that there may be biological effects occurring at exposures below these guidelines;
- biological effects do not necessarily result in health effects;
- gaps in knowledge justify a precautionary approach to the use of mobile phone technologies until much more detailed and scientifically robust information on any health effects becomes available;
- there are possible indirect effects on well being in some cases; and
- drivers should be dissuaded from using either hand-held or hands-free phones whilst on the move.

The review of the scientific information relevant to concerns about exposure to RF radiation was comprehensive and did not demonstrate any clear health effects caused by the use of mobile phones or being in proximity to base stations. However, from the evidence heard by the IEGMP it was clear that there was considerable public concern about the possible health implications of the use of this rapidly developing technology. The Stewart Report contained 34 recommendations, many of which were designed to provide more information about mobile phones and base stations. The recommendations focused on five areas:

- advice to Government;
- advice to industry;
- identification of research requirements;
- the need for better public information and consumer choice; and

- the rôle of NRPB.

The Government, industry and the Board of NRPB welcomed the Stewart Report and considerable effort has now gone into implementing the main recommendations. Some of the main issues addressed are described below.

Exposure Guidelines

NRPB (now HPA-RPD) has the responsibility for advising on exposure guidelines for the UK. Exposure guidelines recommended by NRPB⁴ and by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)⁵ for limiting exposure to electromagnetic fields and radiations are based on comprehensive reviews of the scientific information available and are designed to prevent established adverse health effects. They relate to exposures of people rather than to emissions from devices. For RF radiation the exposure guidelines are designed to prevent adverse health effects resulting from whole body or partial body heating. Basic restrictions on exposure are given in terms of values of the Specific Absorption Rate (SAR) which is a measure of absorption of energy in body tissues.

The recommendations by NRPB in 1993⁴ were designed to limit any increase in body temperature to a fraction of a degree. It was considered that the recommended exposure guidelines were appropriate both for workers and for members of the public. ICNIRP provided further advice on exposure guidelines in 1998⁵. For workers, the rationale and basic restrictions were essentially the same as those of NRPB but a two-tier system was recommended by ICNIRP that made a distinction between occupational and general public exposure. Reductions in basic restrictions by a factor of 5, were recommended for members of the public compared with those for workers, on the assumption that age and health status and hence thermal sensitivity may be different from those of workers. Although little scientific justification for this reduction factor was given, members of the public include the frail, infants and young children and people with disease or taking medicine that may compromise thermal tolerance. Table 1 gives the basic restrictions on exposure recommended by NRPB and ICNIRP.

Table 1: Basic restrictions on exposure recommended by ICNIRP for workers and members of the public

	SAR ^a (W/kg)	
	Worker	Public
Whole Body ^{b,c}	0.4	0.08
Head and Trunk ^{b,c}	10	2.0
Limbs ^{b,c}	20	4.0

^aSAR (specific energy absorption rate) is a measure of the rate at which energy is absorbed by unit mass of tissue in an electromagnetic field. It is measured in the units of watts per kilogram (W kg⁻¹).

^bFor calculating SAR the averaging time is taken to be 6 minutes.

^cThe averaging mass is taken to be 10 g.

In relation to exposure guidelines the IEGMP¹ concluded that:

the balance of evidence to date suggests that exposures to RF radiation below NRPB and ICNIRP guidelines do not cause adverse health effects to the general population" (paragraph 1.17).

However they also considered that:

there is now scientific evidence, however, which suggests that there may be biological effects occurring at exposures below these guidelines" (paragraph 1.18).

Although this did not necessarily mean that these effects lead to disease or injury, it was also concluded 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 the gaps in knowledge are sufficient to justify a precautionary approach (paragraph 1.19).

The IEGMP recommended that, as a precautionary approach, the ICNIRP guidelines for public exposure be adopted for use in the UK rather than the NRPB guidelines. It was felt that this would bring the UK into line with other countries in the European Union. The Government agreed, in line with the recommended precautionary approach, that the emissions from mobile phones and base stations should meet the ICNIRP guidelines as expressed in the EU Council recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz)⁶.

At the request of Government, the NRPB subsequently reviewed the scientific basis for its exposure guidelines for electromagnetic fields for both static fields and time varying fields up to 300 GHz. Early in 2003 it issued a public consultation document on exposure guidelines for electromagnetic fields (EMFs) in the frequency range 0-300 GHz and in May 2004 recommended adoption in the UK of the exposure guidelines of ICNIRP⁷.

The mobile phone network operators now provide evidence that exposure to the fields from base stations meet the ICNIRP public exposure guidelines.

Exposures of the General Public from Base stations

At the open meetings of the IEGMP, concern was expressed about the levels of exposure of people to RF radiation from base stations. The evidence presented on such exposures came principally from measurements made by the NRPB and published in NRPB-R321⁸. Measurements had been made at 118 locations around 17 base station sites. The maximum exposure at any of these locations was 0.18% of the ICNIRP reference level for the public, above which action is recommended, whilst the average level of exposure was about 0.002%.

The IEGMP¹ concluded that:

the balance of evidence indicates that there is no general risk to the health of people living near to base stations on the basis that exposures are expected to be small fractions of guidelines (paragraph 1.33).

The members of IEGMP were however concerned that there could be indirect effects on peoples' well being in some cases, particularly if individuals are concerned about their exposures. One of the recommendations by the Expert Group was that there should be an independent random, ongoing, audit of all base stations. The Office of Communications (Ofcom) has taken this forward. Up to the end of 2004 it had measured about 450 base stations, with emphasis on measurements of sites near to schools and hospitals. The latest information is published on its web site (<http://www.ofcom.org.uk>). RPD has also undertaken further measurements and publishing them on its web site. The results of these more recent measurements are consistent with the conclusions in the Stewart Report.

The Ofcom has also devised the Sitefinder web site, which provides information on the location of all existing macrocell base stations throughout the UK with details of their radio power, type of transmission, height and the operator. More information on a particular site can be obtained on request. Microcell and picocell base stations are also being added to Sitefinder.

The Stewart Report recommended changes to planning guidance for all base station sites and for more information to be made available to both local authorities and members of the public about the siting of base stations. New guidance to local authorities has been issued in England, which aims to provide for more discussions between operators and local authorities on development proposals for telecommunications equipment and to minimise visual intrusion. Mast sharing is encouraged. Where a mast is to be installed near to a school or college local consultation is also required prior to the submission of an application for planning permission. The Government's view is that the objectives of the recommendations in the Stewart Report are now met by the planning process. Revised planning arrangements have also been made in Scotland, Wales and Northern Ireland. Additionally, *A Code of Best Practice on Mobile Phone Network Development*⁹ has been published by the Office of the Deputy Prime Minister with the co-operation of Central Government, Local Government and Industry.

The issue of base station siting has also been addressed by the mobile phone companies and through the Mobile Operators Association (MOA). They have published 10 commitments which indicate that the mobile phone operators are working to involve the local population much more in decisions about the planning and siting of base stations. The network operators will also provide schools with information about emissions from local base stations on request. The MOA has also published a report on Working with the Community, which gives advice on best siting practice¹⁰.

SAR values for phones

The IEGMP recommended that the industry should make available to consumers information on the SAR from phones once a standard method of testing became available. Individuals could then choose to use a phone with a potentially low exposure if they so wished. The international standards body CENELEC agreed a standard testing protocol that was issued in September 2001. Information on the SAR for new phones was made available by the main manufacturers from October 2001 and is now available for all phones of members of Mobile Manufacturers Forum (MMF). The SAR is given in watts per kilogram and the ICNIRP basic restriction for the head and trunk of members of the general public is 2 W kg^{-1} averaged over 10 grams of tissue (Table 1). Phones are tested to ensure that this restriction is not exceeded, even when the phone is operating at its maximum power. In use, however, a mobile phone will often operate at less than full power because it has adaptive power control which ensures that it only uses sufficient power to communicate with the base station network. This conserves battery life. In practice text messaging has become a very popular means of communication among children. This use of the phone does not bring it into close contact with the head, although the phone may be in contact with other parts of the body, and the phone is in use for only a short time compared with voice communication.

Sensitive Groups in the Population

The IEGMP was concerned that there may be sensitive groups in the population. In particular, it felt that:

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 and a longer lifetime of exposure (paragraph 1.53).

They, therefore, recommended in line with their recommended precautionary approach that:

the widespread use of phones by children for non-essential calls should be discouraged (paragraph 1.53).

They also recommended that the mobile phone industry should refrain from promoting the use of mobile phones by children. Subsequent to publication of the Stewart Report, the Department of Health issued two information leaflets on mobile phones and on base stations. These leaflets summarise some of the main conclusions in the Stewart Report. In relation to the exposures of children, it is stressed that the use of phones by children should be kept to a minimum and limited to essential calls only. Around 9 million leaflets have been issued and made widely available in shops selling mobile phones, in doctors' surgeries, post offices and libraries, as well as through local authorities. They have also been translated into Welsh.

Mobile Phones and Driving

The review by IEGMP demonstrated that there was experimental evidence showing that the use of mobile phones whilst driving has a detrimental effect which translates into a substantial increased risk of an accident. The evidence suggested that the negative effects of phone use while driving are similar whether the phone is hand-held or hands-free. It was, therefore, recommended that "drivers should be dissuaded from using either hand-held or hands-free phones whilst on the move".

Following public consultation in 2002, a new prohibition on the use of hand-held mobile phones when driving came into force in England, Scotland and Wales on 1 December 2003. Similar regulations came into force in Northern Ireland on 1 January 2004. The Government have said that they intend to increase the penalty for the new offence by making it endorsable with 3 penalty points and with an automatic fine of £60 (€85).

Research Priorities

The IEGMP identified a number of areas where more research was desirable. This related particularly to signals from handsets although research on the consequence of exposure to RF would also be applicable to base station transmissions. The areas identified were brain function, exposure to pulsed signals, dosimetry, sub-cellular and cellular changes, physiological and sociological studies, epidemiological and human volunteer studies. It also recommended that this should be supervised by "a demonstrably independent panel" and funded jointly by the mobile phone companies and the public sector.

The Mobile Telecommunications Health Research (MTHR) Programme was launched in February 2001 with a total budget of £7.4M funded by Government and industry on a 50:50 basis and overseen by an independent Programme Management Committee (PMC). To date 28 projects are being managed by the MTHR programme. Details of the research being funded can be found on the MTHR web site (www.mthr.org.uk). Most of these project are scheduled for completion by the end of 2006.

Advice to NRPB

The Stewart Report gave advice to NRPB on how it might better prioritise its work in relation to public concerns about non-ionising radiation. Since publication of the Stewart Report the Board of NRPB has set up a new Advisory Group on Radiation, Risk and Society, which is examining how NRPB/RPD tackles issues of public concern. The RPD web site has been redesigned to facilitate its accessibility and has developed content for the site directed at providing information for the general public. More effort has been put into giving advice to the public on concerns about NIR, further base station surveys have been carried out and the research programme and services work relevant to health concerns related to exposures to EMFs has been extended. HPA-RPD answers about 10,000 questions a year on concerns about sources of and exposures to non-ionising radiation. The NRPB has also prepared a video (in PAL and NTSC standards) and a CD on *Mobile Telephony and Health* which addresses the health issues of mobile telephony, describes the technology of mobile phones and base stations and shows how measurements of exposure can be made. This has been made available to all local authorities.

Report by AGNIR in 2003

A recommendation in the Stewart Report was that the issue of possible health effects from mobile phone technology should be the subject of a further review in three years time, or earlier if circumstances demand it. The government asked the board of NRPB to undertake this review and the Board asked the independent Advisory Group on Non-ionising Radiation (AGNIR) to carry this out.

The review by AGNIR was published in the 2003 volume of the documents of NRPB². It included an overview of the sources of RF fields to which people may be exposed as well as providing reviews of experimental biology and epidemiology published since the Stewart report had been issued. Although the emphasis of human health studies has been on possible effects on cancer the report included information on non-cancer epidemiology and clinical research as well as studies on human brain activity and cognitive function.

The report concluded that the biological evidence suggests that RF fields do not cause mutation or initiate or promote tumour formation, and the epidemiological data overall do not suggest causal associations between exposure to RF fields, in particular from mobile phones, and the risk of cancer. In aggregate the research published since the IEGMP report does not give cause for concern. The weight of evidence now available does not suggest that there are adverse health effects from exposure to RF fields below guideline levels, but published research on RF exposures and health has limitations, and mobile phones have only been in widespread use for a relatively short time. The possibility therefore remains open that there could be health effects from exposure to RF fields below guideline levels; hence continued research is needed.

In addition to the AGNIR review a number of other reviews of possible effects of exposure to RF fields from mobile phones and base stations. These include reports from the Netherlands^{11,12}, France¹³, USA¹⁴, Canada¹⁵, Sweden¹⁶ and ICNIRP¹⁷. The main conclusions in these and other recent reports are very similar to those of IEGMP in relation to possible health effects from exposure to RF from both mobile phones and base stations, although the Health Council of the Netherlands did not see a reason to recommend that mobile telephone use by children be limited as far as possible.

Mobile Phones and Health 2004

Despite this general consensus about the possible health effects of exposure to RF fields from the use of mobile phones a number of outstanding issues remain. To a large extent these arise from the very rapid and widespread development of the use of mobile telecommunications and the limited follow up studies on exposed populations. For this reason the Board of NRPB issued a further report on *Mobile Phones and Health 2004*³. This was published in January 2005 in the Documents of NRPB. The report reviewed the responses by government and others to the recommendations in the Stewart Report, as discussed above, and also examined issues where the Board considered further actions continue to be needed.

A principal conclusion was that development in the use of mobile phones had not been associated with any clearly established effects. The report stressed that there was a lack of

hard information showing that mobile systems are damaging to health. Nevertheless, the widespread use of mobile phones is recent and technology continues to develop. In addition, some data suggest that RF fields from mobile phones can interfere with biological systems and it has not yet been possible to carry out long term epidemiological studies on mobile phone users. The Board was also concerned that members of the public include people with varying susceptibility to any health effects. They therefore recommended that a precautionary approach should still be adopted to the development of mobile phone technology and that further research should be carefully prioritised to address outstanding issues. These include: epidemiological studies of mobile phone users; research to examine any effects on children and to obtain further information on the condition of electromagnetic hypersensitivity and its possible impact on health and well-being; studies on any effects on brain function and on possible mechanisms involved in RF effects; and complementary dosimetry studies focussed on ascertaining the exposure of people to RF.

Conclusions

The Stewart Report was a milestone in the way that issues of public concern are addressed. Considerable progress has been made in implementing the recommendations in the report and providing more information to the public. There remain concerns about exposure to radiofrequencies from mobile phone and related technologies. Reviews of published research do not demonstrate any clear evidence of any health effects at the levels of exposure to RF involved. Nonetheless the widespread use of phones is relatively recent and further research is needed. There is also evidence that some individuals may be sensitive to RF fields and this condition needs to be explored further. To address remaining concerns by the public further improvements are needed in the way that information is provided. In the UK this is particularly in relation to local base station developments. The ongoing research programme should also provide further information to address remaining health concerns about exposures to radiofrequency radiation from the use of mobile phones and base stations.

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About the author

Dr J W Stather, BSc, MSc, PhD
Radiation Protection Division
Centre for Radiation, Chemical and Environmental Hazards
Health Protection Agency
Chilton, Didcot, Oxon, OX11 0RQ, UK

Dr John Stather is a Deputy Director of RPD. He is responsible for the work of the Physical Dosimetry, Occupational Services and Operational Protection Departments and the Radiation and Environmental Monitoring, Scotland. RPD is responsible for giving advice to the UK Government and the devolved administrations on protection standards for ionising and non-ionising radiations. It also carries out research to support its advice and provides technical services.

After obtaining his first degrees in the Biological Sciences at Reading University he obtained a Masters degree in Radiobiology and then a PhD at the University of Birmingham. He joined the Medical Research Council, Radiological Protection Service in 1968 and transferred to NRPB when it was formed in 1971. He became Head of the Biomedical Effects Department in 1986, he was promoted to the post of Assistant Director in 1990 and to his present position in 1997. He transferred with the RPD to the HPA when it was formed on 1st April 2005.

Dr Stather's research work has been mainly concerned with radiological protection problems associated with the biokinetics, dosimetry and risks associated with intakes of radionuclides. He has been involved in studies related to the movement of radionuclides through the foodchain, and assessments of the health effects resulting from their discharge into the environment. He has also been responsible for work related to the dosimetry and effects of non-ionising radiations, in particular electromagnetic fields and ultraviolet radiation. He has served on a number of international committees concerned with radiation protection issues.

He is an NRPB representative on NRPB's Advisory Groups on Ionising and Non-ionising Radiation and was Secretary to the Independent Expert Group on Mobile Phones that reported in May 2000 (www.iegmp.org.uk). He also contributed to the recent NRPB report on Mobile Phones and Health 2004. He is an Honorary Fellow of the Society for Radiological Protection. He has published widely in his fields of study and has given invited lectures at scientific meetings on environmental and radionuclide dosimetry as well as on the effects of ionising and non-ionising radiation.

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11. Addressing Mobile Phone EMF Issues in Japan: DoCoMo's Approaches

Hideaki Okamoto, NTT DoCoMo, Inc.

Introduction

Mobile phone subscribers in Japan approached 87 million by the end of March 2005. This is a remarkable rate of growth given that 10 years ago there were around 8 million subscribers. The effect of exposure to electromagnetic fields generated by mobile phones used to be of interest only to professionals, but now is attracting the attention of consumers. The invisibility of radio waves along with conflicting information is causing anxiety in the general public. Mobile communication operators are expected to promote a correct understanding of radio waves and their characteristics to gain more confidence from the general public. Hosting community seminars to discuss the process of base station construction and the use of mobile communication devices is one of the approaches.

While the interest of the general public on this issue is increasing, the national government has already voted into law, the radio radiation protection standards that had previously been used as a guideline by communication service providers to assure safe usage of their radio operations. In spite of the fact that radio operators, including mobile communication carriers, are in compliance with such regulations, the general public does not have a correct understanding of RF safety. It is a fact that some local communities and organizations have raised concerns about the construction of base stations and the use of mobile phones.

This paper describes how NTT DoCoMo, a mobile communication operator, is addressing the issues associated with EMF and an RF environment.

The Current Status in Japan

Approach for protection from EMF

Japan was one of first countries in the world to begin addressing EMF issues. Scientific knowledge and findings of over forty years was aggregated and the Radio Radiation Protection Guidelines were established in 1990. Along with the exploding growth of mobile phones, the guidelines for the "partial specific absorption rate" (partial SAR) were added in 1997 because consumers were increasingly irradiated by radio focused in localized areas, such as their temple. The radio radiation protection guidelines were legislated and regulations regarding the radio wave output of base stations for mobile communications and mobile phones went into effect in 1999 and 2002. The radio radiation protection guidelines have a five thousand percent safety margin for the amount of radiation that is considered harmful to human health (the Threshold). This standard for radio radiation should provide peace of mind. In Responding to these guidelines, the Association of Radio Industries and Businesses (ARIB), the industry standard organization in Japan formulated its radio radiation protection guidelines for promoting a better understanding of RF safety and voluntary operational standards.

Japan is also addressing the impact of electromagnetic waves from mobile phones on medical equipment and in response, many safety measures have been

implemented. The potential malfunction of medical equipment due to electromagnetic waves was reported in 1995, and the Electromagnetic Compatibility Conference Japan (EMCC) conducted experiments to reproduce the effects of EM waves from mobile phones on medical equipment. Its result, titled “The guideline for usage of mobile phones and other devices to prevent RF effects on medical equipment” was published. The report suggests (1) do not bring mobile phones into hospital operating rooms, ICUs and CCUs, (2) turn off mobile phones in examination rooms, treatment rooms, and patient rooms, and (3) persons with an implanted cardiac pacemaker should keep a distance of 22 cm or more between the pacemaker and their mobile phone. The study also pointed out the need for awareness of mobile phone use, not only in hospitals, but in any crowded situation, including trains. Furthermore, it is said that mobile phone use might interfere with electronics used on an airplanes and any use of mobile phones and other radio-controlled equipment was prohibited in 2004.

Community Understanding

Considering the number of base stations in existence, objections to their construction has been fairly limited. The majority of the general public either is not worried about the effects of electromagnetic wave, or they do not care. They, in turn, enjoy the convenience of mobile phones and welcome the expansion of coverage areas. The lack of a thorough explanation of RF characteristics and base station construction can sometimes result in a loss of trust in the carrier and can escalate as far as a community campaigns against base station construction. There are several cases which have resulted in litigation. Complainers’ mistaken perceptions regarding radio waves of mobile phones leads to distrust of the government and operators. “Radio waves are harmful”, the complainers’ typical misunderstanding is often attributed to biased, sensationalized, dramatic media reports. The terms “Threshold” and the safety standards recommended in guidelines are often confused as well. Radio irradiation above the standard does not immediately cause health problems because it has the safety margin of 50 times, but this is not clearly communicated to those who fear of radio waves. User education is a key element in addressing the EMF issues.

Approaches used by Mobile Phone Operators

Common Approaches by Carriers and Operators

National governments and other international public organizations such as WHO, say there is no clear evidence of electromagnetic wave affecting human health, as long as it is within regulated EMF safety levels and the mobile communication operators agree. The operators fully comply with the guidelines, which are now the legislated standards in the operations of the base stations and sales of mobile handsets. They also find a strong need to provide consumers with accurate information about electromagnetic fields generated by mobile phones, and each operator publishes the SAR data in the user’s manual and on their web sites. This is in accordance with procedures used by other western countries when the regulations went into effect. The SAR data for the phone models that had been released into markets before the regulations were adopted, assured that they were within the limits of the guideline and the information was willingly published.

DoCoMo's Approach

Examples of DoCoMo's approach to radio radiation protection are described here: discussions with local residents about the base station construction and activities for to educate the general public with correct information regarding RF safety.

Discussions with local residents

The following is a standard procedure used by DoCoMo, to obtain the understanding and support of local residents for construction of a base station:

(1) Approval is obtained from the landowner (or the property owner for a multi-unit dwelling such as a condominium). Then, at the request of the owner, a meeting with local residents is held, where brochures prepared by the ministry governing radio operations (Ministry of Internal Affairs and Communication) and other official references are used to explain safety of radio operation. Such a meeting is always held for the construction of a radio tower.

(2) A meeting to describe the construction process is provided to the local residents when the base station construction agreement is signed.

(3) A meeting is hosted if a complaint is filed. Although approval of the property owner is always obtained in advance, it is practically impossible to obtain support of all interested residents before the commencement of construction. DoCoMo believes that discussions with the residents should focus on (1) providing a swift response, (2) not aggravating the complainer, and (3) being honest, which can settle objections in most cases. A quick response is the most important action among the three. If swift action is not taken, anxiety and distrust of the residents will quickly grow into an opposition movement that is very difficult to resolve. In these communities, a more sympathetic approach will be necessary. DoCoMo believes it is important to see such a movement as an opportunity to hear valuable opinions of the community instead of viewing it as simply a complaint or harassment. Many complainers and protesters have erroneous perceptions about safety of radio operations. The meeting is also an opportunity for DoCoMo to educate the general public in how to correctly interpret the radio radiation protection guidelines, statements published by MIC and other public authorities, and the results of safety studies and research. DoCoMo makes sure to respond all questions raised by the attendants. Protesters tend to exploit government agencies and mass media to get what they want. Therefore, DoCoMo tries to clearly communicate with them that they are in full compliance with laws and regulations and to provide them with accurate and correct information about effects of electromagnetic fields on the human body and electronic products. DoCoMo also believes it is important to face their opponents with respect and good faith, and provide them with periodic opportunities for discussion. DoCoMo measures the strength of RF signals and/or electromagnetic fields to demonstrate that safety is maintained.

Validation of Safety

Mobile communication operators are not in a position to take the lead in offering opinions on regulations established by the government and topics like bio-medical/life science where they have no expertise. It is the service providers' responsibility and a critical task, however, to actively address the safety of radio or electromagnetic fields for users' confidence in safety of mobile phone use. DoCoMo has developed an instrument

which measures the strength of an electromagnetic field that visualizes the radio waves from a mobile communication base station. This device provides an EMF measurement at the request of local residents. Such efforts by DoCoMo have eased the initial anxiety of residents and helped to gain residents' acceptance for base station construction.

As for the safety of radio waves, DoCoMo conducted an extensive cell-level experiment to study in detail the effects of radio and electromagnetism at cell and gene levels. This experiment is part of the impact studies of radio waves and electromagnetic fields on the human body, that was a collaboration of four mobile communication operators in Japan. DoCoMo contracted a disinterested third party laboratory to perform the actual test. The interim report, released to the media on April 26, 2005, found that electromagnetic fields had no effect on cells or genes. Experts are in the process of validating the test results in order to maintain objectivity, and DoCoMo believes this report will contribute to promoting consumers' better understanding of radio safety.

Japan is also concerned about the impact of radio waves on medical equipment, so studies are continuously being conducted by public and government organizations. DoCoMo participates in these studies by providing measurements taken by their field instruments. When the guidelines regarding the use of mobile phones in medical facilities were drafted, DoCoMo developed a method to accurately evaluate the effects of electromagnetic fields on an implanted pacemaker and provided support in taking measurements and reviewing the resulting effects on all models of implantable pacemakers in the domestic market. In addition, DoCoMo is actively supporting other impact studies for equipment used on aircraft.

Etiquette in consumer use is becoming a problem while the mobile phone penetration rate is growing. Some problems simply require user's social common sense and morality such as refraining from talking on the phone in a crowd and others require specific knowledge as to the effects on medical equipment. DoCoMo actively promotes users' awareness and proper etiquette through the user's manual, TV advertisements, and other communication tools.

Conclusion

This paper shows how DoCoMo, as a mobile communication operator, is addressing mobile phone induced EMF concerns in Japan. The main approach DoCoMo uses is to be fully compliant with the rules and regulations for radio radiation protection and to openly and sincerely discuss the concerns of general public by actively sharing correct information about radio wave by referencing comments of public authorities rather than expressing DoCoMo's own interpretation. DoCoMo continues to pay close attention to activities of WHO and other international organizations and collaborate with Japanese government agencies and the industry in studying the impact of radio wave to human health as well as electronic devices.

About the author

Hideaki Okamoto

Master of Science in Engineering

Mr. Okamoto Joined Nippon Telegraph and Telephone Corporation (NTT) in 1994. He was assigned to research the technology to improve mobile communication transmission quality. In 1999 he was transferred to NTT DoCoMo and assigned to study microwave propagation characteristics. Transferred in 2004 to Network Planning Department, Mr. Okamoto has been supporting internal education of mobile communication radio environment and collaborates with external organizations to promote understanding of radio wave safety. Presently, he is a manager of Electromagnetic and Environment Management Group.

12. Mobile EMF and Industry's approach in Germany

Philipp Kornstaedt studied business management at the Helmut-Schmidt-Universität in Hamburg, Germany. He has previously worked for the German Ministry of Defence in the field of public and risk communication. Currently he is working as an expert radio communication, environment, health and safety for the mobile phone operator T-Mobile Deutschland.

Abstract of the presentation

- Public protest against antenna sites from the point of view of a mobile phone operator
- Types of public protest
- Results of public protest
- Target groups for local risk management/communication
- Confidence building through transparency and openness
- Communication channels
- The IZMF as an external cooperation partner
- Communicating with local government politicians
- summary