

Proceedings

リテラジャパン主催 第2回 リスクセミナー 携帯電話のリスクをどう考えるか

2015年2月4日[水] スイス・ジュネーヴ

4 February, 2015 Warwick Geneva Hotel

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Organiser Litera Japan
Risk Seminar series no.2

Mobile phones and risks

1. Preface

Professor Ortwin Renn

Department for Sociology of Environment and Technology,
University of Stuttgart

The use of mobile phones has proliferated over the last three decades. The number of mobile phones that are operated in the world amounts to around 6 billion rapidly approaching the figures for the world population. It has become the most attractive electric device in the world topping such popular items as transistor radios or washing machines. Benefits from mobile communication are now widely distributed, and mobile phones have become objects of mass consumption. At the same time, however, the risk of electromagnetic fields (EMF) associated with mobile phones has been a major concern of many citizens worldwide and led to protest movements and social opposition to siting transmitter stations in many countries.

Social mobilizations against base station transmitters began in the late 1990s and have remarkably increased in number and intensity from 2000 to 2007. After 2007 the protest movement declined yet it is still present in many countries, in particular when new local transmitter stations are being planned or constructed. Protest is organized by different types of groups: a) preexisting associations, groups and committees already active against power lines or electromagnetic fields in general; b) newly constituted groups or associations, both at the local and national level; c) environmental groups and neighborhood organizations. The evolution of mobilization has been discontinuous. Protest began only several years after the appearance of base station transmitters and it increased after the promulgation of national regulations on electromagnetic emissions. Citizens who protest against the proliferation of the base station transmitters are mostly concerned about possible health effects. They strongly resent the lack of information and consultation and often accuse public authorities of being unable or unwilling to resist the pressure of manufacturers and to contrast their strategies in the name of social interests and needs. The risk field EMF is indeed characterized by uncertainty and ambiguity in at least four spheres of collective life: Science; Society; Politics; and

Law. Scientific uncertainty is basically due to the difficulty of drawing ultimate conclusions about the health effects of the electromagnetic waves on the human body. The potential health impacts, if there are any, are hidden within the background noise of cancer occurrences and cannot be proven statistically. It is impossible to prove that EMF have no effect but there is also no conclusive evidence that there is a measurable risk to human health. Scientific uncertainty derives also from the application of different research methods, namely laboratory studies and epidemiological studies. Societal uncertainty is related to the behavior of the (public and private) actors engaged in activities concerning mobile telecommunication and its risks. It is severe when respect for government agencies is low, individualism prevails and there is little or no integration of publics and institutions. Institutional uncertainty derives from a lack of collaboration and/or trust among institutions. While rapid and consistent communication is important, the necessary channels of understanding and confidence are absent. Last but not least, there is a legal or juridical uncertainty. Matters of uncertainty are related to the territorial distribution of regulatory competences, the overlap between health, land use and commercial aspects, and the adoption of the precautionary principle.

The challenge for the diffusion of mobile communication therefore consists in the different point of views of the relevant actors. Central governments and local administrations have acknowledged the attractiveness of the technological devices for the vast majority of people but feel also pressured by (opposing) requests from citizens and mobile phone companies. Their institutional task is to enforce regulation whilst in the meantime their political interest is to reduce conflict. The distribution of risks is unequal, as only part of the population is exposed to electromagnetic emissions from transmitters, i.e. people whose houses or workplaces are close to the base station transmitters.

As a means to deal with these conflicts, participatory processes have evolved in different ways in various countries, ranging from risk communication programs directed towards local residents to establishing platforms for citizens to co-design stations or to voice their preferences for siting facilities. Usually, there is no legal obligation to devise inclusive policy procedures, but experience has shown that an honest effort to include local citizens has been successful in aligning the technical infrastructure needs with the local residents' concerns for a safe environment.

The proceedings of this seminar show the need to engage in more dialogue and risk communication even if the victory path for mobile phones continues world-wide. The use of phones do not invalidate the efforts of many actors such as regulatory agencies, city councils, phone providers and others for dealing prudently with local residents when siting new transmitter stations or enhancing the mobile phone net. Different from other areas of risk protests such a nuclear energy or waste incinerators, most of these efforts to include concerned citizens in planning, designing and locating transmitter stations, have been successful and rewarding for all actors involved. Successful communication includes an honest review of health impacts, a clear distinction between hazard and risk, and the flexibility to move stations away from very sensitive areas. Truthful information combined with respect for concerned citizens are the most important ingredients to gain acceptance for a continuous diffusion of mobile communication in the world.

オートウィン・レン教授

ドイツ・シュトゥットガルト大学環境技術社会学科 (SOWI V) および
Dialogik (ディアロギック) 代表



2. Public participation in the siting of mobile phone base stations

Dr. rer. nat. Evi Vogel

Bavarian State Ministry of the Environment and Consumer Protection
Munich / Germany

Despite the fact that nowadays the use of mobile phones is ubiquitous and emission levels around base stations usually are well below the limit values recommended by the World Health Organisation (WHO), public debates about base stations are continuing in many countries. As forecasts show, mobile data traffic will increase significantly over the next years whereas the capacity of base stations will develop much slower, therefore the number of base stations has to increase and consequently the debates will remain.

There are several reasons for such debates: primarily negative health effects are feared, but also a value depreciation of property and the disruption of the landscape by the base stations. Additionally, there is the jealousy towards those who earn money by allowing mobile phone antennas on their houses or grounds to be built and the lacking possibility of the general population to have a say in the siting of the base stations. Therefore scientific research concerning possible health effects has to be complemented with information campaigns, measurement data and policies allowing the public to participate in finding sites for new base stations.

The WHO recognized the need for guidance of dialogue processes accompanying the siting of base stations and approached this subject already in conferences in 1997 and 1998. Subsequently a WHO handbook on "Establishing a dialogue on risks from electromagnetic fields" was published and can be found on their internet site http://www.who.int/peh-emf/publications/risk_hand/en/.

In the following the example of the Bavarian "Mobilfunkpakt" is described to illustrate an option of how the public can participate in the siting of mobile phone base stations.

Framework for the Pact: Legal requirements for base stations in Germany

Already in December 1996 a federal ordinance was passed to regulate non-ionizing radiation, adopting

ICNIRP (International Commission on Non-Ionising Radiation Protection) and WHO recommendations for the protection of the public. This ordinance was amended in August 2013, using the latest international recommendations and including more precautionary measures than before (http://www.gesetze-im-internet.de/bimschv_26/index.html). In the frequency range of mobile telephony, the amendment now also decrees a participation of the communities in the siting of mobile phone base stations.

In the high frequency range the compliance with the limit values of the ordinance is controlled by the Federal Network Agency („Bundesnetzagentur“ www.bnetza.de). For each base station to be built they calculate the so called safety distance, the distance where the field strength falls below the limit value. Then they issue a certificate containing the antenna data and the safety distance to be kept which has to be handed in to the appropriate district authorities before the base station goes into operation. The Federal Network Agency each year runs a large number of sample measurements throughout Germany to test compliance with this certificate.

Additionally, each base station to be built has to fulfill the building laws, which slightly differ within the different German states. In Bavaria only base stations higher than 10 meters need a building permit, smaller ones may be erected without such a permit; the building permit has to be requested from the respective community.

Therefore many of mobile phone base stations in Bavaria have been built without the knowledge of the communities, because they did not need a building permit. Thus when the construction machines arrived, neither the community nor the citizens knew what for.

So especially at the height of the base station roll out, around the year 2000, this missing information lead to a lot of unpleasant situations and press campaigns, particularly so in Southern Germany.

Development of the Bavarian " Mobilfunkpakt"
Consequently in Bavaria a first contract between

mobile phone providers and the Bavarian Environmental Ministry was signed in 1999. Accordingly, the providers had to organize regional conferences once a year in order to inform about new plans for siting mobile phone base stations in general and they had to share larger masts (with fixed percentages). On the other hand, information campaigns for different stakeholders were organized by the Bavarian Environmental Ministry. In 2001 another contract was signed between the providers and the Bavarian Environmental Ministry, this time it was a pilot project including 60 smaller communities and 6 bigger cities which took part in testing the possibilities of how to include the communities in the siting of mobile phone base stations.

At about the same time the mobile phone providers signed a contract on a federal level, allowing for more information and research. However, it contained no framework for participation in the siting of mobile phone base stations.

Meanwhile the evaluation of the Bavarian pilot project was used as a basis for the Bavarian “Mobilfunkpakt II” . It was signed in 2002 by the mobile phone providers, the Council of the Bavarian Communities and the Bavarian Environmental Ministry. This pact has been prolonged several times and still is in operation.

(http://www.stmuv.bayern.de/umwelt/strahlenschutz/elektromagnetische_felder/mobilfunkpakt/index.htm).

Contents of the Bavarian “Mobilfunkpakt II”

The pact contains a detailed framework for the participation of communities in the siting of mobile phone base stations:

For communities larger than 50 000 inhabitants the setup of round tables with the relevant stakeholders is suggested which then have a constant dialogue process about the roll out of base stations and inform the public on a regular basis.

In smaller communities, with less than 50 000

inhabitants, the community can signal its will to participate in the siting process within 30 days after the provider informs about new plans. They then have 2 months to suggest up to three sites which the provider then has to check for eligibility. If one of the suggestion of the community qualifies, it has to be adopted by the provider. In any case a final discussion about the siting has to be held in the community.

Additionally, commitments of the State of Bavaria are included in the pact, such as a measurement programme for the communities. A community can apply for it whenever a new site is planned and 33% of the costs for the measurements are paid by the Environmental Ministry, 57% by the mobile phone providers and 10% by the respective community. Meanwhile such measurements were done in more than 600 communities. Furthermore, there is a simplified process when base stations are to be built on state properties (e.g. buildings or forests) and the Bavarian Environmental Ministry consented to and regularly conducts training for their environmental engineers and the public health service, information campaigns and EMF monitoring. All these measures are summed up in a yearly report.

Since the introduction of the pact the protest wave has been pacified continually.

Already in 2007 a poll among the 2000 communities in Bavaria with a response rate of about 50% showed that about 80% wanted the pact to continue and only in 13% of the communities severe problems with mobile phone base stations existed.

Further development

The amendment of the federal ordinance mentioned above contains a short paragraph stating that as of August 2013 the community in whose territory a new high frequency antenna is to be built has to be informed by the provider. Then it has the possibility to give a written comment and discuss this comment with the provider; the result has to be considered.

However, under scrutiny this legal obligation is much weaker than the requirements laid down in the “Mobilfunkpakt II” . Therefore - for the time being - it was decided to continue with the pact, which exceeds the legal obligation, because the process of the “Mobilfunkpakt” is well known and observed in Bavaria and objectifies heated local discussions.

As the pact expires end of 2015, the signatories will meet in spring to discuss the conditions for its prolongation.

Dr. Evi Vogel

Evi Vogel received her diploma in physics with a minor in physiology and her PhD in theoretical radiation biophysics from the University Erlangen, Germany. After post-doctoral research she started working for the German Federal Office of Radiation Hygiene in 1994. Her main subjects were non-ionising radiation, its application to medicine and medical ultrasound. In 1998 she transferred to the Bavarian State Ministry of the Environment and Consumer Protection. She is head of the unit “Noise, Non- Ionising Radiation and Sustainable Mobility” Her main tasks are the design of communication programmes and measurement campaigns as well as the engagement of the public in decision making. She was seconded to WHO/Geneva from 10/2000 to 3/2001, where she worked for the International EMF Project and is co-author of the WHO book on "Establishing a dialogue on risks from electromagnetic fields". From 3/2011 to 7/2011 she was seconded to the Permanent Representation of Bavaria in Brussels. She worked in several national and international working groups on EMF.

エヴィ・フォーゲル

ドイツバイエルン州環境消費者保護局
騒音・非電離放射線担当責任者。



3. How to interpret health risks

Dr. Mariko Nishizawa

Risk communication expert. Director of Litera Japan.

Associated member of Japan Science Council and member of the advisory panel to the Japanese Ministry of General Affairs on mobile phone and radiation.

リテラジャパン主催 Risk seminar no2
携帯電話のリスクをどう考えるか
Mobile phone and risks 2015年1月19日
Warwick Hotel, Geneva

LITERA JAPAN

リスクの考え方
How to interpret health risks and communicate them

リテラジャパン(株式会社リテラシー) 代表取締役
ドイツ シュトゥットガルト大学 技術環境社会学科 フェロー・研究員

西澤 真理子 Mariko Nishizawa, PhD
(PhD in Risk Policy and Risk Communication)

Geneva EMF nishizawa 1

今日の要旨

1. リスクとハザードの違い
2. リスク評価の手順、「2B」の誤解
3. なぜリスコミが必要か
4. 携帯電話のハザード同定時の混乱

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1. リスクとハザードの違い (risk and hazard)

リスクの考え方

出典:『リスク評価ハンドブック p4』より

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Risk and hazard are often mixed and misunderstood.

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2. リスク評価の手順 (Risk assessment)

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発がんハザードについての発がんグループ (国際がん研究機関 IARC)の考え方

- グループ1 ダイオキシン、たばこ、アルコール飲料、放射線など(因果関係が明白なハザード)
- グループ2A **グリシドール、アクリルアミド**(たばこ人に発がん性あり)
- グループ2B コーヒー、低周波磁界、**携帯電磁波**(人に発がん性の可能性あり)
- グループ3 人の発がん性について分類ができない
- グループ4 たばこ、人の発がん性の可能性がない

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IARCの報告は

その物質の発がん性の科学的根拠
の強さで定性的「ハザード評価」。
定量的「リスク評価」でない。



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3. リスコミがなぜ必要か



出典:リテラジャパン『リスク評価ハンドブック』2012

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ELF (2B) の評価時の提言 (優先順位順)

1. Further research should be conducted 研究
2. Risk communication is encouraged リスコミ
3. Low-cost ways of reducing exposures may be explored
携帯電話のリスク評価も同じ？

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4. 携帯電話のハザード同定 (2B) 時の 混乱 (IARC 2011)

- The World Health Organization's International Agency for Research on Cancer (IARC) today classified *mobile phone* use and other radiofrequency electromagnetic fields as a possible carcinogen (group 2B). May 31, 2011.
- Mobile EMF users warned over cancer link (The Independent).
- Mobiles may cause brain cancer (BBC).

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リスコムを Need for risk communication

- Risk communication is to “convey” risk assessment/management and make their best use in society.
- Risk communication needs to be well designed/planned and tailored to the needs of audience.
- Failure to do so can easily jeopardies science/management.

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- 西澤 真理子 (2013)『リスクコミュニケーション』エネルギーフォーラム新書
- 西澤真理子 (2012)『リスク評価を読み解くハンドブック』第二版 リテラジャパン発行
- 西澤真理子 (2014)『リスクコミュニケーションハンドブック』第4版 リテラジャパン発行

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Dr. Mariko Nishizawa

Dr Nishizawa is Representative Director/Founder, Litera Japan Corporation which is a consultancy firm specialised in risk communication. <http://literajapan.com>.

After having earned her PhD degree in Risk Communication and Policy from Imperial College London, she joined the Centre for Technology Assessment in Baden-Württemberg, University of Stuttgart led by Professor Ortwin Renn. During her research in Europe between 1996-2005, she has widely worked in risk communication-related fields such as EMF, global warming, genetic technology, BSE and future energy.

She currently serves as Associated Member of Science Council of Japan, Adjunct Professor University of Tokyo and gives policy advices to ministries such as Ministry of Health (MHLW), Ministry of Education (MEXT), Ministry of General Affairs and Tokyo Fire Department.

西澤真理子

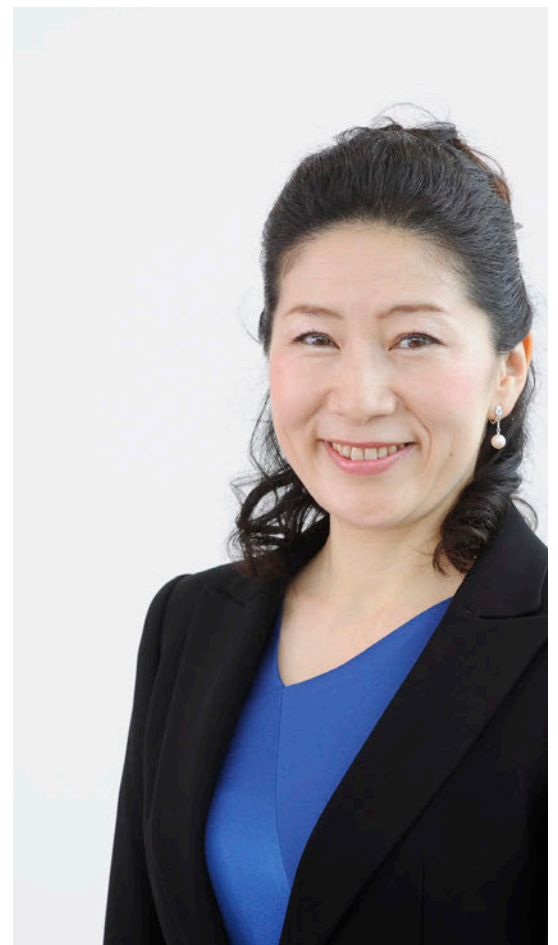
上智大学外国学部ドイツ語学科卒。

銀行（現みずほ銀行）勤務、製品安全コンサルタント（テュフ ラインランド株式会社）を経て、英国ランカスター大学環境政策修士号、インペリアルカレッジ・ロンドンにて博士号を取得（Imperial College London PhD in Risk Policy and Communication, DIC）。

ドイツ学術交流会（DAAD）奨学生として、ドイツ・バーデンビュルテンブルク技術アセスメントセンター客員研究員。その後、フンボルト財団特別国費研究員、シュトゥットガルト大学社会学部環境技術社会学科プロジェクトリーダーなど、10年のイギリスとドイツでの研究生生活を経て2006年帰国。株式会社リテラシー（通称リテラジャパン）を設立。

現在、シュトゥットガルト大学社会学部環境技術社会学科研究フェロー、東京大学農学部非常勤講師（技術者倫理）、筑波大学工学部非常勤講師、他。

総務省総合通信基盤局 生体電磁環境に関する検討会委員会委員、電波の医療機器等への影響に関するワーキンググループ委員、厚生労働省 薬事・食品衛生審議会委員、文部科学省 科学技術・学術審議会 人材委員会委員、東京消防庁火災予防審議会部会委員。情報化推進国民会議本委員。2011年には福島県飯館村リスクコミュニケーションアドバイザーを務める。



4. How risks of mobile phones are discussed


Daniel Storch, PhD.

Head of Section.


Radiological Protection / Section Non-Ionising Radiation and Dosimetry.

Federal Office of Public Health FOPH.

Federal Departement of Home Affairs FDHA.



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra





Federal Administration
Federal Department of Home Affairs FDHA
Federal Office of Public Health FOPH

How risks of mobile phones are discussed

4. February 2015, Warwick Geneva Hotel

Daniel Storch
Federal Office of Public Health





Introduction Risk Communication at FOPH

In the context of uncertainty in the field of EMF, information of the public is an important issue. A well informed public is able to act in a **self-responsible** way and apply precautionary measures.


The internet has been chosen by the FOPH as the main medium for the direct information of the general public about EMF.

The access to the internet is widely-spread in Switzerland; already in 2005 70% of the population older than 14 years used the internet as a medium for information.






2014 Factsheet about induction hobs had more than 1'000'000 clics

Factsheets in 3 country specific languages (German, French, Italian) and English.


2








Factsheets

Household	
	Energy-saving lamps (68'681 clics/yr)
	Induction hobs (1'039'253 clics/yr)
	Microwave ovens
	Waterbeds
Household	
	Magnetic mattress pads


3








Factsheets II

Telecommunication	
	Mobile phones (141'256 clics/yr)
	Cordless (DECT) phone
	WLAN (138'002 clics/yr)
	Bluetooth
	Baby monitors


4



Factsheets III

Traffic	
	Cars, hybrid cars
Toys	
	Magnets
Heating	
	Electric floor heating system
	Electric water heater
	Electrical radiators
	...

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Layout of the factsheets

Part 1 - Summary of relevant health aspects

- Risk assessment
- (Simple) advices

Part 2 - detailed information

- technical aspects
- health aspects
- limits (law, technical, ...)
- health assessment
- regulatory framework
- references

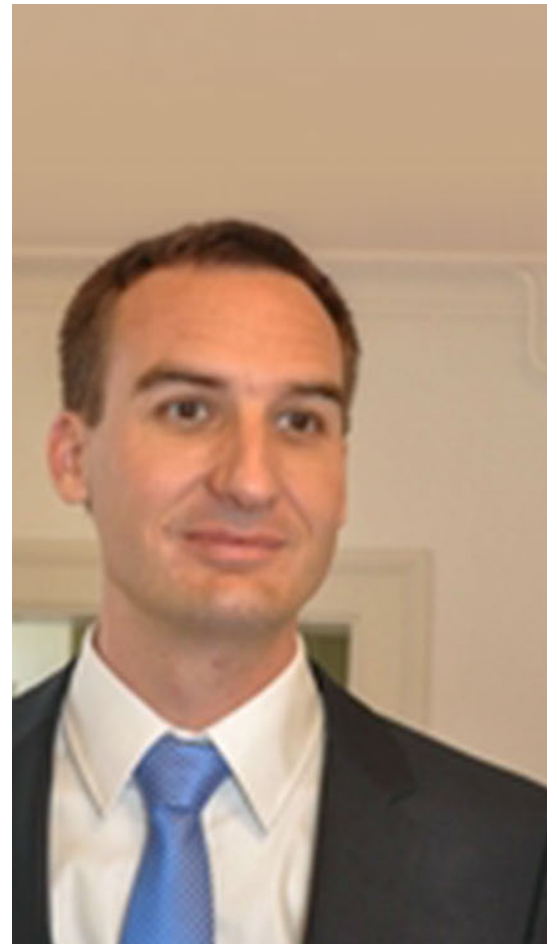
6

Daniel Storch, PhD.

1999 MSc in Chemistry and Economics of the University of Basle
2005 PhD in Medicinal / Radiological Chemistry at the University Hospital of Basle
2007 - 2012 Federal Coordination Office for CBRNe-protection at the Spiez Laboratory
2012 - 2014 Federal Office of Public Health / Radiological Risks Sektion
Since October 2014 Head of Section of "Non-Ionising Radiation and Dosimetry" at the Federal Office of Public Health

ダニエル・シュトルヒ

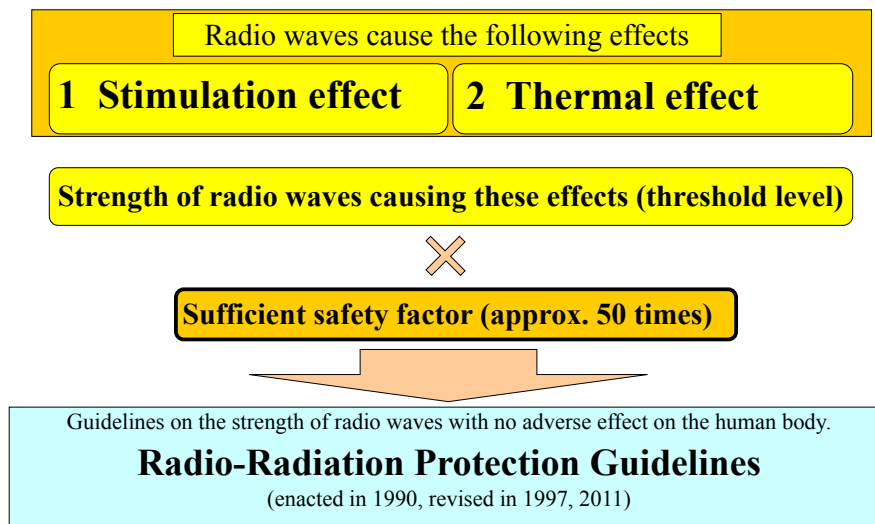
スイス衛生局（スイス内務省）
放射線防護・非電離放射線・線量部門 部門長。



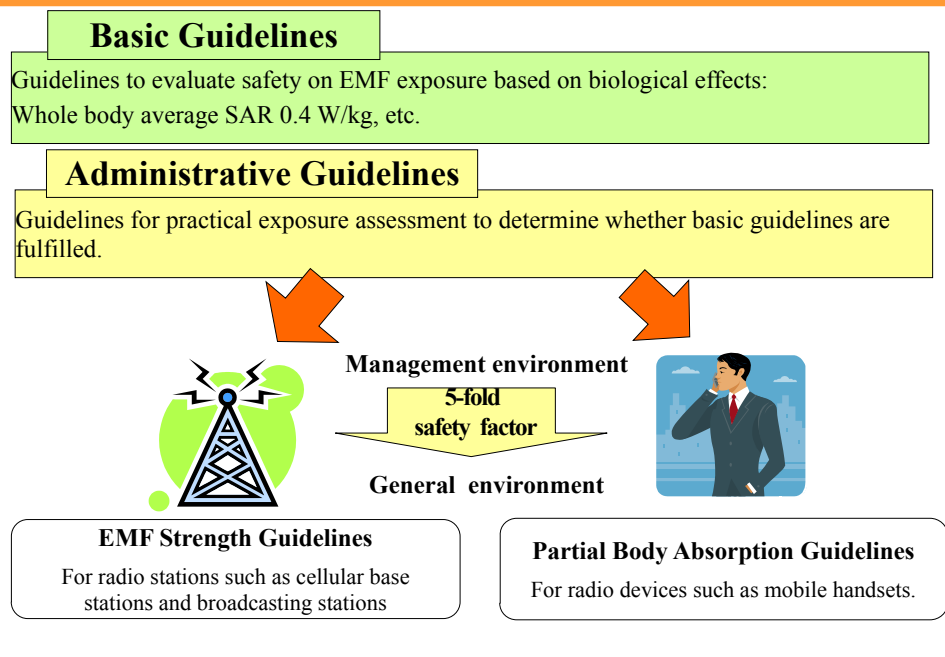
Appendix-1

Radio-radiation protection guidelines of Japan

1 Overview of Radio-Radiation Protection Guidelines



2 Composition of the Guidelines



3 EMF Strength Guidelines

EMF Strength Guidelines

Applicable when the whole body is evenly exposed to radio.

Guideline for EMF strength under general environment (Average time: 6 minutes)

Frequency f	Electrical field strength E (V/m)	Magnetic field strength H(A/m)	Power flux Density S(mW/cm ²)
10kHz - 30kHz	275	72.8	
30kHz - 3MHz	275	$2.18f^{1/2}$	
3MHz - 30MHz	$824f^{1/2}$	$2.18f^{1/2}$	0.2 $f/1500$ 1
30MHz - 300MHz	27.5	0.0728	
300MHz - 1.5GHz	$1.585f^{1/2}$	$f^{1/2}/237.8$	
1.5GHz - 300GHz	61.4	0.163	

* f means frequency expressed in unit of MHz.

4 Partial-Body Absorption Guidelines

Partial-Body Absorption Guidelines (1997)

	Management environment	General environment
Whole-Body Average SAR	0.4 W/kg	0.08 W/kg
Local SAR	For any 10g of tissue : 10 W/kg 20W/kg (the limbs)	For any 10g of tissue : 2 W/kg 4 W/kg (the limbs)
Contact Current	When contact hazard is not prevented : 100mA (Frequency range of 100kHz to 100MHz)	When contact hazard is not prevented : 45mA (Frequency range of 100kHz to 100MHz)

(Average time: 6 minutes)

5 Enactment of the Guidelines

1. Safety facilities against RF-EMF exposure

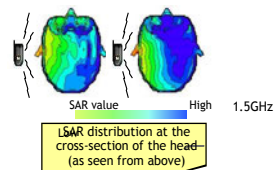
Obligation to install safety facilities to prevent the general public from entering sites where EMF strength exceeds the limit values.
(October 1999)



2. Limit of energy absorbed by the human head

Limit of Specific Absorption Rate (SAR) of RF energy absorbed into human head (2W/kg), defined as mandatory standard.

Subject : Mobile phone, Satellite cellular phone and Broadband Wireless Access
(June 2002)



3. Limit of energy absorbed by the human body

Limit of Specific Absorption Rate (SAR) of RF energy absorbed by human body (2W/kg (4W/kg for arms and legs)), defined as mandatory standard.

Subject : Mobile phone, Satellite cellular phone and Broadband Wireless Access
(April 1st, 2014)



Appendix-2

Japan's contribution to WHO EMF project by ARIB

電波の健康影響に関するWHOのリスク評価について

世界保健機関（WHO）は2014年9月30日、無線周波（RF）電磁界ばく露による健康影響に関する公式のリスク評価文書である「環境保健クライテリア（EHC）*1」の専門家向けのコンサルテーション（コメント）用草案を公表しました*2。

今回公表されたEHC草案は、2012年12月までに発表された査読付き論文*3に基づいています（2013年12月までの事例も少数あります）。今回のEHC草案には、電磁環境委員会が20年以上にわたり、我が国の研究者に委託して実施した数々の研究も多数貢献しています（別紙をご参照下さい）。

今後、WHOは2014年12月15日までに提示されたコメントを集約後、2015年秋にRF電磁界の健康リスクに関する各分野の専門家で構成されるタスクグループ会合を招集し、最終草案を作成します。この最終草案には、今回のEHC草案にはない「第1章 要約」、「第13章 健康リスク評価」、及び「第14章 防護措置」の各章も盛り込まれることになっています。その後、編集作業等を経て正式版を2016年に公表予定です。

今回のEHC草案の公表に伴い、WHOはファクトシートNo.193「電磁界と公衆衛生：携帯電話」を改訂しました*4。その結論は従来と同じく、「携帯電話が潜在的な健康リスクをもたらすかどうかを評価するために、これまで20年以上にわたって多数の研究が行われてきました。今日まで、携帯電話使用を原因とするいかなる健康影響も確立されていません」というものです。

電磁環境委員会は今後も電波の健康影響に関する研究を継続し、事実を正確に公表する等の活動を通じて、日本国内のみならず国際的にもこの分野で貢献していく所存です。

以上

本件に関するお問合せ先：
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*1 世界保健機関(WHO)、国際労働機関(ILO)及び国連環境計画(UNEP)が共同で実施している国際化学物質安全性計画(IPCS)の活動のひとつで、広範囲な化学物質をはじめとして騒音、電波・電磁波及び放射性核種が人の健康や環境へ与える影響についての専門家による評価をまとめたものです。

*2 http://www.who.int/peh-emf/research/rf_ehc_page/en/#

*3 同じ分野の研究者による匿名の審査を経て、学術専門誌に掲載された論文を指します。

*4 <http://www.who.int/mediacentre/factsheets/fs193/en/>

今回のEHC草案で援用されているARIB委託研究

【携帯電話電波の脳細胞に及ぼす影響についての研究】

- ▶ Hirose H, Sasaki A, Ishii N, Sekijima M, Iyama T, Nojima T, Ugawa Y. 1950 MHz IMT-2000 field does not activate microglial cells in vitro. Bioelectromagnetics. 2010 Feb;31(2):104-12.
(「8章 神経変性疾患」、「10章 免疫系及び血液学」、「12章 がん」で引用)

【携帯電話電波の生殖器に与える影響についての研究】

- ▶ Imai N, Kawabe M, Hikage T, Nojima T, Takahashi S, Shirai T. Effects on rat testis of 1.95-GHz W-CDMA for IMT-2000 cellular phones. Syst Biol Reprod Med. 2011 Aug;57(4):204-9.
(「11章 生殖能、生殖及び子どもの発達」で引用)

【携帯電話電波の脳血流に与える影響に関する再現実験】

- ▶ Mizuno Y, Moriguchi Y, Hikage T, Terao Y, Ohnishi T, Nojima T, Ugawa Y. Effects of W-CDMA 1950 MHz EMF emitted by mobile phones on regional cerebral blood flow in humans. Bioelectromagnetics. 2009 Oct;30(7):536-44.
(「5章 脳の生理学及び機能」で引用)

【携帯電話の電波による脳の血液脳関門の機能への影響の調査】

- ▶ Masuda H, Ushiyama A, Takahashi M, Wang J, Fujiwara O, Hikage T, Nojima T, Fujita K, Kudo M, Ohkubo C. Effects of 915 MHz electromagnetic-field radiation in TEM cell on the blood-brain barrier and neurons in the rat brain. Radiat Res. 2009 Jul;172(1):66-73.
(「5章 脳の生理学及び機能」で引用)

【携帯電話使用中の聴性脳幹反応の変化に対する研究】

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(「6章 聴覚、前庭及び眼の機能」で引用)

【携帯電話の側頭葉抑制性介在ニューロンへの影響】

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(「6章 聴覚、前庭及び眼の機能」で引用)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. Clin Neurophysiol. 2006 Apr;117(4):900-5.
(「5章 脳の生理学及び機能」で引用)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. Clin Neurophysiol. 2006 Nov;117(11):2504-11.
(「5章 脳の生理学及び機能」で引用)

【近傍電磁界ばく露による幼少ラットの脳機能に及ぼす影響】

- ▶ Kuribayashi M, Wang J, Fujiwara O, Doi Y, Nabae K, Tamano S, Ogiso T, Asamoto M, Shirai T. Lack of effects of 1439 MHz electromagnetic near field exposure on the blood-brain barrier in immature and young rats. Bioelectromagnetics. 2005 Oct;26(7):578-88.
(「5章 脳の生理学及び機能」で引用)

【携帯電話によるヒト聴覚野への影響】

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(「6章 聴覚、前庭及び眼の機能」で引用)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. Clin Neurophysiol. 2006 Apr;117(4):900-5.
(「5章 脳の生理学及び機能」で引用)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. Clin Neurophysiol. 2006 Nov;117(11):2504-11.
(「5章 脳の生理学及び機能」で引用)

【高周波電磁波の発がんに及ぼす影響】

1. ラット中期肝発がん性試験による電波 (900 MHz, 1.5 GHz) の影響
 - ▶ Imaida K, Taki M, Yamaguchi T, Ito T, Watanabe S, Wake K, Aimoto A, Kamimura Y, Ito N, Shirai T. Lack of promoting effects of the electromagnetic near-field used for cellular phones (929.2 MHz) on rat liver carcinogenesis in a medium-term liver bioassay. Carcinogenesis. 1998 Feb;19(2):311-4.
(「7章 神経内分泌系」、「12章 がん」で引用)
 - ▶ Imaida K, Taki M, Watanabe S, Kamimura Y, Ito T, Yamaguchi T, Ito N, Shirai T. The 1.5 GHz electromagnetic near-field used for cellular phones does not promote rat liver carcinogenesis in a medium-term liver bioassay. Jpn J Cancer Res. 1998 Oct;89(10):995-1002.
(「7章 神経内分泌系」、「12章 がん」で引用)
2. マウス皮膚の発がんにおける電波 (1.5 GHz) の影響
 - ▶ Imaida K, Kuzutani K, Wang J, Fujiwara O, Ogiso T, Kato K, Shirai T. Lack of promotion of 7,12-dimethylbenz[a]anthracene-initiated mouse skin carcinogenesis by 1.5 GHz electromagnetic near fields. Carcinogenesis. 2001 Nov;22(11):1837-41.
(「7章 神経内分泌系」、「12章 がん」で引用)

【携帯電話電磁場のヒト中枢神経への影響に関する研究】

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(「6章 聴覚、前庭及び眼の機能」で引用)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. Clin Neurophysiol. 2006 Apr;117(4):900-5.
(「5章 脳の生理学及び機能」で引用)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. Clin Neurophysiol. 2006 Nov;117(11):2504-11.
(「5章 脳の生理学及び機能」で引用)

【携帯電話からの高周波ばく露に関する細胞生物学的影響調査】

- ▶ Tian F, Nakahara T, Wake K, Taki M, Miyakoshi J. Exposure to 2.45 GHz electromagnetic fields induces hsp70 at a high SAR of more than 20 W/kg but not at 5W/kg in human glioma MO54 cells. Int J Radiat Biol. 2002 May;78(5):433-40.
(「12章 がん」で引用)
- ▶ Koyama S, Nakahara T, Wake K, Taki M, Isozumi Y, Miyakoshi J. Effects of high frequency electromagnetic fields on micronucleus formation in CHO-K1 cells. Mutat Res. 2003 Nov 10;541(1-2):81-9.
(「12章 がん」で引用)

以上

WHO released draft of health risk assessment on RF fields

On September 30, 2014, the World Health Organization (WHO) released draft of "Environmental Health Criteria Monograph (EHC)*1" on radiofrequency (RF) fields, which is formal risk assessment in regard to all health effects of RF exposure, for expert consultation.*2

The draft of EHC is based on peer-reviewed papers*3 published by December 2012 (in a few instance to December 2013). Many studies conducted by Japanese researchers, to which the Electromagnetic Environment Committee had commissioned for more than 20 years, contributed to the draft (see Attachment).

WHO will consider all comments submitted by December 15, 2014, then convene Task Group meeting consisted of experts in each fields related to health risk of RF in Autumn of 2015, and prepare final draft of EHC. Unpublished chapters "1: Summary and recommendations for further study", "13: Health risk assessment" and "14: Protective measures" will also be included in the final draft. After editing and other procedures, WHO is expected to publish official version of EHC in 2016.

Along with the release of the draft of EHC, WHO revised "Fact sheet No.193: Electromagnetic fields and public health: mobile phones" in October 2014.*4 The conclusion was not changed: "A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."

The Electromagnetic Environment Committee will continue research on health effects of RF and contribute to the field, via activities such as publishing facts correctly, not only in Japan but also worldwide.

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*1 One of the activities of the International Programme on Chemical Safety (IPCS), a cooperative programme of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO) and WHO. EHC documents provide international, critical reviews on the effects of chemicals or combinations of chemicals and physical and biological agents on human health and the environment. <http://www.who.int/ipcs/publications/ehc/en/>

*2 http://www.who.int/peh-emf/research/rf_ehc_page/en/#

*3 Papers published on scientific journals via critical review by the anonymous experts of the same fields.

*4 <http://www.who.int/mediacentre/factsheets/fs193/en/>

ARIB-commissioned studies referenced by the draft of EHC

[Effects of mobile phone RF on brain cells]

- ▶ Hirose H, Sasaki A, Ishii N, Sekijima M, Iyama T, Nojima T, Ugawa Y. 1950 MHz IMT-2000 field does not activate microglial cells in vitro. *Bioelectromagnetics*. 2010 Feb;31(2):104-12. (referenced in Chapter 8: Neurodegenerative disorders; Chapter 10: Immune system and haematology; Chapter 12: Cancer)

[Effects of mobile phone RF on reproductive organ]

- ▶ Imai N, Kawabe M, Hikage T, Nojima T, Takahashi S, Shirai T. Effects on rat testis of 1.95-GHz W-CDMA for IMT-2000 cellular phones. *Syst Biol Reprod Med*. 2011 Aug;57(4):204-9. (referenced in Chapter 11: Fertility, reproduction and development)

[Replication experiment related to effects of mobile phone RF on cerebral blood flow]

- ▶ Mizuno Y, Moriguchi Y, Hikage T, Terao Y, Ohnishi T, Nojima T, Ugawa Y. Effects of W-CDMA 1950 MHz EMF emitted by mobile phones on regional cerebral blood flow in humans. *Bioelectromagnetics*. 2009 Oct;30(7):536-44. (referenced in Chapter 5: Brain physiology and function)

[Effects of mobile phone RF on blood-brain barrier function]

- ▶ Masuda H, Ushiyama A, Takahashi M, Wang J, Fujiwara O, Hikage T, Nojima T, Fujita K, Kudo M, Ohkubo C. Effects of 915 MHz electromagnetic-field radiation in TEM cell on the blood-brain barrier and neurons in the rat brain. *Radiat Res*. 2009 Jul;172(1):66-73. (referenced in Chapter 5: Brain physiology and function)

[Change of auditory brainstem response during mobile phone use]

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. *Clin Neurophysiol*. 2003 Aug;114(8):1390-4. (referenced in Chapter 6: Auditory, vestibular and ocular function)

[Effects of mobile phone on temporal lobe inhibitory interneurons]

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. *Clin Neurophysiol*. 2003 Aug;114(8):1390-4. (referenced in Chapter 6: Auditory, vestibular and ocular function)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. *Clin Neurophysiol*. 2006 Apr;117(4):900-5. (referenced in Chapter 5: Brain physiology and function)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. *Clin Neurophysiol*. 2006 Nov;117(11):2504-11. (referenced in Chapter 5: Brain physiology and function)

[Effects of near-field electromagnetic field exposure on brain function of young rats]

- ▶ Kuribayashi M, Wang J, Fujiwara O, Doi Y, Nabae K, Tamano S, Ogiso T, Asamoto M, Shirai T. Lack of effects of 1439 MHz electromagnetic near field exposure on the blood-brain barrier in immature and young rats. *Bioelectromagnetics*. 2005 Oct;26(7):578-88. (referenced in Chapter 5: Brain physiology and function)

[Effects of mobile phone on human visual cortex]

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(referenced in Chapter 6: Auditory, vestibular and ocular function)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. Clin Neurophysiol. 2006 Apr;117(4):900-5.
(referenced in Chapter 5: Brain physiology and function)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. Clin Neurophysiol. 2006 Nov;117(11):2504-11.
(referenced in Chapter 5: Brain physiology and function)

[Effects of high-frequency RF on carcinogenesis]

1. Effect of radio wave (900 MHz, 1.5 GHz) by medium-term liver carcinogenesis test in rats
 - ▶ Imaida K, Taki M, Yamaguchi T, Ito T, Watanabe S, Wake K, Aimoto A, Kamimura Y, Ito N, Shirai T. Lack of promoting effects of the electromagnetic near-field used for cellular phones (929.2 MHz) on rat liver carcinogenesis in a medium-term liver bioassay. Carcinogenesis. 1998 Feb;19(2):311-4.
(referenced in Chapter 7: Neuroendocrine system; Chapter 12: Cancer)
 - ▶ Imaida K, Taki M, Watanabe S, Kamimura Y, Ito T, Yamaguchi T, Ito N, Shirai T. The 1.5 GHz electromagnetic near-field used for cellular phones does not promote rat liver carcinogenesis in a medium-term liver bioassay. Jpn J Cancer Res. 1998 Oct;89(10):995-1002.
(referenced in Chapter 7: Neuroendocrine system; Chapter 12: Cancer)
2. Effects of RF (1.5 GHz) on skin carcinogenesis of mice
 - ▶ Imaida K, Kuzutani K, Wang J, Fujiwara O, Ogiso T, Kato K, Shirai T. Lack of promotion of 7,12-dimethylbenz[a]anthracene-initiated mouse skin carcinogenesis by 1.5 GHz electromagnetic near fields. Carcinogenesis. 2001 Nov;22(11):1837-41.
(referenced in Chapter 7: Neuroendocrine system; Chapter 12: Cancer)

[Effect of mobile phone electromagnetic fields on human central nervous]

- ▶ Arai N, Enomoto H, Okabe S, Yuasa K, Kamimura Y, Ugawa Y. Thirty minutes mobile phone use has no short-term adverse effects on central auditory pathways. Clin Neurophysiol. 2003 Aug;114(8):1390-4.
(referenced in Chapter 6: Auditory, vestibular and ocular function)
- ▶ Yuasa K, Arai N, Okabe S, Tarusawa Y, Nojima T, Hanajima R, Terao Y, Ugawa Y. Effects of thirty minutes mobile phone use on the human sensory cortex. Clin Neurophysiol. 2006 Apr;117(4):900-5.
(referenced in Chapter 5: Brain physiology and function)
- ▶ Terao Y, Okano T, Furubayashi T, Ugawa Y. Effects of thirty-minute mobile phone use on visuo-motor reaction time. Clin Neurophysiol. 2006 Nov;117(11):2504-11.
(referenced in Chapter 5: Brain physiology and function)

[Cellular biological effects related to high-frequency exposure from mobile phone]

- ▶ Tian F, Nakahara T, Wake K, Taki M, Miyakoshi J. Exposure to 2.45 GHz electromagnetic fields induces hsp70 at a high SAR of more than 20 W/kg but not at 5W/kg in human glioma MO54 cells. Int J Radiat Biol. 2002 May;78(5):433-40.
(referenced in Chapter 12: Cancer)
- ▶ Koyama S, Nakahara T, Wake K, Taki M, Isozumi Y, Miyakoshi J. Effects of high frequency electromagnetic fields on micronucleus formation in CHO-K1 cells. Mutat Res. 2003 Nov 10;541(1-2):81-9.
(referenced in Chapter 12: Cancer)

- End -