

# Electromagnetic Environment Policies in Japan

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Ministry of Internal Affairs and Communications



- I. **Committee on the Possible Adverse Health Effects of Radio Frequency Electromagnetic Fields**
- II. **Study of the Effects of Radio Waves on Medical Equipment**

*Investigation/research  
on the safe use of **radio** waves*

*Stipulation/enforcement  
of guidelines on the safe use of radio  
waves*

**Secure the environment  
to ensure the safe and worry-free use  
of radio waves !**

*International  
collaboration/cooperation  
on the safe use of radio waves*

*Notification/public relations  
on the safe use of radio waves*

- iii. **IMPROVING THE LITERACY ON THE SAFETY OF RADIO WAVES**

**COMMITTEE ON THE POSSIBLE ADVERSE HEALTH  
EFFECTS OF RADIO FREQUENCY  
ELECTROMAGNETIC FIELDS**

**In order to scientifically clarify the effects of radio waves on the human body, research on biological safety evaluation is being promoted.**

## 1. Committee to promote research on the possible biological effects of electromagnetic fields

“Committee to promote research on the possible biological effects of electromagnetic fields”, comprised of medical and engineering researchers (Chairman: Shogo Ueno, Professor Emeritus of the University of Tokyo Professor of the Kyushu University) has met since fiscal year 1997 to implement studies on biological safety evaluation using animal experiments for 10 years.

The report was issued in April 2007, bringing the report point together.

## 2. Major activities

### ○Promotion of studies

- Epidemiological research
- Animal experiments
- Cellular studies
- Dosimetry                      etc.

### ○International collaborations

- Collaboration with international organizations such as the WHO.
- Collaboration and cooperation with other countries through the expert meetings.

1. The RRPB (Radio Radiation Protection Guidelines) were enacted in 1990 and revised in 1997 by the Japanese government (MIC) based on the vast scientific knowledge accumulated over the last 50 years.

The guidelines constitute a sufficient safety factor for the threshold of the biological effects of radio waves.

2. Public concern about the possible health effects of radio waves increased in the rapid growth of mobile phones.

International and national organizations have consistently claimed that there is no evidence of adverse effects of radio waves on health as long as the levels of the radio wave exposure are below the guideline level of the RRPB.

3. There have been some reports suggesting possible adverse effects of low-level exposure below the guideline level. These reports include data obtained from inappropriate experimental conditions.

Reproducibility is required for the safety assessment.

Correct information should be presented to alleviate the public anxiety.

4. The Japanese government (MIC) established the Committee to Promote Research on the Possible Biological Effects of Electromagnetic Fields in 1997 and has been conducting studies for 10 years to promote researches on the biological safety evaluation of radio waves in cooperation with the International EMF project of the WHO and other countries.

Based on the findings obtained through the activities, the Committee concludes that there is no effect of radio waves emitted by mobile phone base stations and mobile phone handsets on the human body.

The Committee also evaluated the reports which suggest adverse effects by carefully designed experiments, and found no evidence of such effects of radio waves emitted by base stations or mobile phones.

5. **The Committee concludes that no clear evidence is found of the effects of radio waves on the human body at intensity levels lower than those specified in the RRPB (Radio Radiation Protection Guidelines).**

## **Future Objectives**

**WHO has announced that many objectives remain to be investigated.**

**It is important to work towards the higher reliability of scientific data and to continue to promote researches on assessing the safety of radio waves.**

- 5. The Committee concludes that no clear evidence is found of the effects of radio waves on the human body at intensity levels lower than those specified in the RRPG (Radio Radiation Protection Guidelines).**

## Future Objectives

**WHO has announced that many objectives remain to be investigated.**

**It is important to work towards the higher reliability of scientific data and to continue to promote researches on assessing the safety of radio waves.**

## 1. Effects on children

- The current RRPG (Radio-Radiation Protection Guidelines) is for people of all ages including children. The guideline values are adequate. No immediate revision is required.
- Based on proposals made by the WHO, continuous planning of various studies assessing effects on children is required.

## 2. Effects of long-term radio wave exposure

- No effects of long-term radio wave exposure on development of brain tumours was found.
- For international harmonisation, an epidemiological study on the long-term use of the mobile phone was planned and conducted.

## 3. Electromagnetic hypersensitivity (EHS)

- According to the WHO, no scientific evidence was found relating symptoms of electromagnetic hypersensitivity and exposure to electromagnetic fields.
- To prevent misinformation from spreading, correct information based on scientific evidence needs to be published.

## 4. Concepts of the Precautionary Principles

- The current RRPG constitute an appropriate precautionary measure. Views are similar to that of the WHO.

## 5. Radio-Radiation Protection Guidelines

- Current RRPG is appropriate. No immediate revision is required.
- In future, along with developing technologies, changes in radio wave use will be taken into account. International research trends and various research outcomes will be considered. The necessity of revised versions of international guidelines and RRPG will be discussed.

## 6. Risk communication

- Organised by the Ministry of Internal Affairs and Communications, lectures have been given to the public and network providers by governmental administrations and experts.
- Continuous activities, i.e., giving public lectures, are important to give people correct information about radio waves.

## 1. Human voluntary study

- Research on symptoms caused by mobile phones such as electromagnetic hypersensitivity
- Effects of radio waves emitted by base stations on sleep

## 2. Epidemiological study (investigation of the effects of long-term exposure on humans)

- Follow-up study on adult mobile phone users
- Epidemiological studies on mobile phone use and health during childhood and adolescence

## 3. *In vivo* study

- Investigation into effects of electromagnetic environment on the function of immune system and its development
- Biological effects of local radio wave exposure on the brain at developmental stages, and its threshold search
- Effects of radio wave complex exposure from multiple radio wave exposure to organisms.
- Reevaluation of the validity of the guideline value of the effects caused by extremely-high-frequency radio waves and sub-millimeter wave exposure to the eye

## 4. *In vitro* study

- Evaluations on cellular biological effects and mechanism analysis of radio waves
- Evaluations on biological electric properties of extremely-high-frequency radio waves and sub-millimeter wave zones, and development of *in vitro* exposure apparatus
- Evaluations on experiments on microwave radiation effects on immunocytes and glia cells

## 5. Dosimetry study

- Property assessment on Whole-Body average SAR and core temperature of children
- Empirical based validity assessment and verification of electromagnetic intensity levels stated in the guidelines .



## Purpose of Establishment

### [Background]

After the closure of the Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields (in FY 2006), the researches on safety evaluation of radio wave have been continued and new results have been issued.



It is necessary to evaluate and analyze the results of new researches, both at home and abroad, and conduct reviews, including extracting the issues to be addressed.

### (1) Evaluating and analyzing the research results at home and abroad

The results of new researches and the result of experimental reproductions both at home and abroad are evaluated and analyzed.

### (2) Extracting the research issues to be addressed

In response to the “Many objectives remain to be investigated” remark made by the Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields, the committee emphasized the importance of promoting researches on the safety of radio waves while improving the reliability of scientific data. (Researches are conducted by considering the trends at WHO.)



## Extracting the Research Issues to be Addressed

### (3) Evaluating and Validating the RRPG

Based on the evaluation and analysis of the results of the latest researches, the current Radio Radiation Protection Guidelines (RRPG) are evaluated and validated.

### (4) Other related issues

Other related issues, such as international contributions, are reviewed if necessary.

## Scheme of Establishment

### 1. Background and Purpose

With the rapid expansion of radio wave applications following the recent spread of mobile phones and commercialization of new radio systems, there are more chances for people to use radio waves every day, which results in growing concern as to the health effects of radio waves among the general public.

Under such circumstances, the Research Committee is established for the purposes of promoting researches by evaluating and analyzing the results of the researches on the possible effects of radio waves on the human body both at home and abroad and extracting the issues to be addressed, and of constructing a society in which people can use radio waves safely and securely, by evaluating and validating the Radio Radiation Protection Guidelines (RRPG).

### 2. Activities

- (1) Evaluating and analyzing the results of the researches on the effects of radio waves on the human body at home and abroad
- (2) Extracting the themes to be addressed by research on the effects of radio waves on the human body
- (3) Evaluating and Validating the RRPG
- (4) Other related issues

### 3. Schedule

The Committee is currently aiming to issue a report in 2010.

\* The meeting will be held several times a year.

# Committee on the Possible Adverse Health Effects of RF Electromagnetic Fields(3)



Name (Alphabetical Order)	Position
IMAIDA Katsumi	Professor, Onco-Pathology, Department of Pathology and Host-Defense Faculty of Medicine, Kagawa University
UGAWA Yoshikazu	Professor, Department of Neurology, School of Medicine Fukushima Medical University
USHIYAMA Akira	Chief, Amenity Promotion Section, Department of Environmental Health, National Institute of Public Health
(Chairperson) OHKUBO Chiyoji	Visiting Professor, Graduate School of Pharmaceutical Sciences, Meiji Pharmaceutical University
OKUNO Tsutomu	Senior Fellow, National Institute of Occupational Safety and Health
KAMADA Tamaki	Senior Assistant Director, Products Testing Department, National Consumer Affairs Center of Japan
KUMADA Akiko	Associate Professor, Department of Electrical Engineering and Information Systems The University of Tokyo
SASAKI Hiroshi	Professor, Medical Research Institute, Kanazawa Medical University
JIMBO Yasuhiko	Professor, Graduate School of Frontier Sciences, University of Tokyo
TAKI Masao	Professor, Department of Science and Engineering, Tokyo Metropolitan University
TSUNEMATSU Yukiko	Visiting Professor, Department of Pediatrics, Juntendo University School of Medicine
NAGAWA Hirokazu	Professor, Graduate School of Medicine, The University of Tokyo
NISHIZAWA Mariko	Lecturer, University of Tokyo
NOJIMA Toshio	Professor, Graduate School of Information Science and Technology, Hokkaido University
HIDA Eriko	Sub-Director, Life Environment Section, <NPO>Tokyo League of Regional Women's Organizations (TOKYO-CHIFUREN)
FUJIWARA Osamu	Professor , Department of Computer Science and Engineering, Graduate School of Engineering, Nagoya Institute of Technology
MIYAKOSHI Junji	Professor, Department of Radiological Life Sciences Division of Medical Life Sciences, Graduate School of Health Sciences, Hirosaki University
YAMAGUCHI Naohito	Professor, Department of Public Health, School of Medicine, Tokyo Women's Medical University
YAMANE Kaori	President, "SHUFUREN" (The federation of consumer organizations)
WATANABE Soichi	Research Manager, Electromagnetic Compatibility Group, Applied Electromagnetic Research Center, National Institute of Information and Communications Technology

# **STUDY OF THE EFFECTS OF RADIO WAVES ON MEDICAL EQUIPMENT**

## **“Guidelines on the Use of Radiocommunication Equipment such as Mobile Phones and Safeguards for Electronic Medical Equipment”** (Electromagnetic Compatibility Conference\*, March 1997)

### **Use of mobile phones in medical institution**

OPHS service condition

- Restrict the PHS use to the type that the medical institution approves of.
- Easy and clear PHS type distinction.

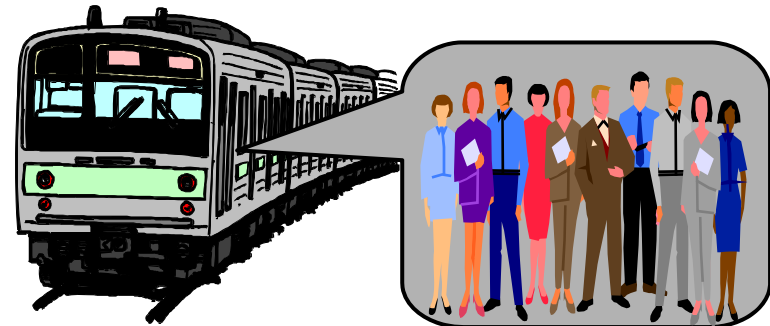


- Do not bring mobile phones into the operating room, the intensive care unit, etc.
- Turn mobile phones off in the inspection room, the examination room, the sickroom, etc.
- Use mobile phones only in the places that the medical institution allows.

## “Guidelines on the Use of Radiocommunication Equipment such as Mobile Phones and Safeguards for Electronic Medical Equipment”

(Electromagnetic Compatibility Conference\*, March 1997)

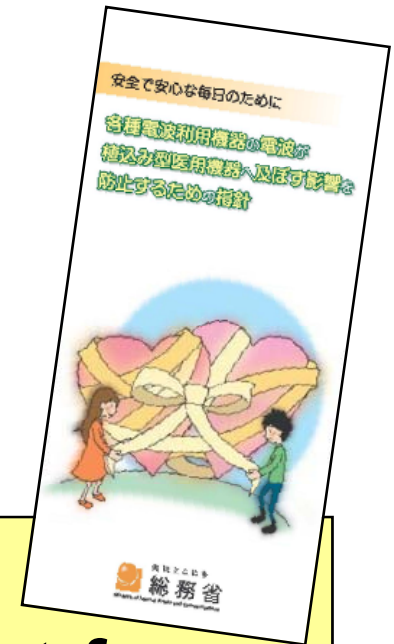
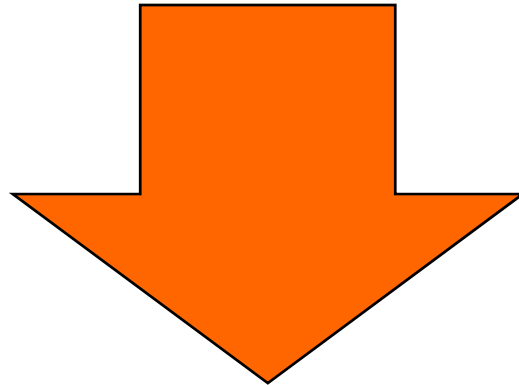
### Special care for the patients implanted with a pacemaker



Use mobile phones 22 centimeters or more apart from the pacemaker's point of installation.

Turn mobile phones off in crowded places such as packed trains.

## MIC has continued to carry out investigations since 2000.



## “Guidelines on the Use of Radiocommunications Equipment for Implanted Medical Devices”

(MIC, enacted in August 2005, revised in April 2007)

# Outline of the Method of Investigation

- [Preparations]
- Installing an implantable cardiac pacemaker (ICP) or cardioverter defibrillator (ICD) into a human phantom
  - Setting the operation mode of the ICP or ICD, and adjusting the measuring equipment
- [Test Procedure]
- Performing a test using pseudo radio equipment with a dipole antenna
  - Performing a test using real radio equipment

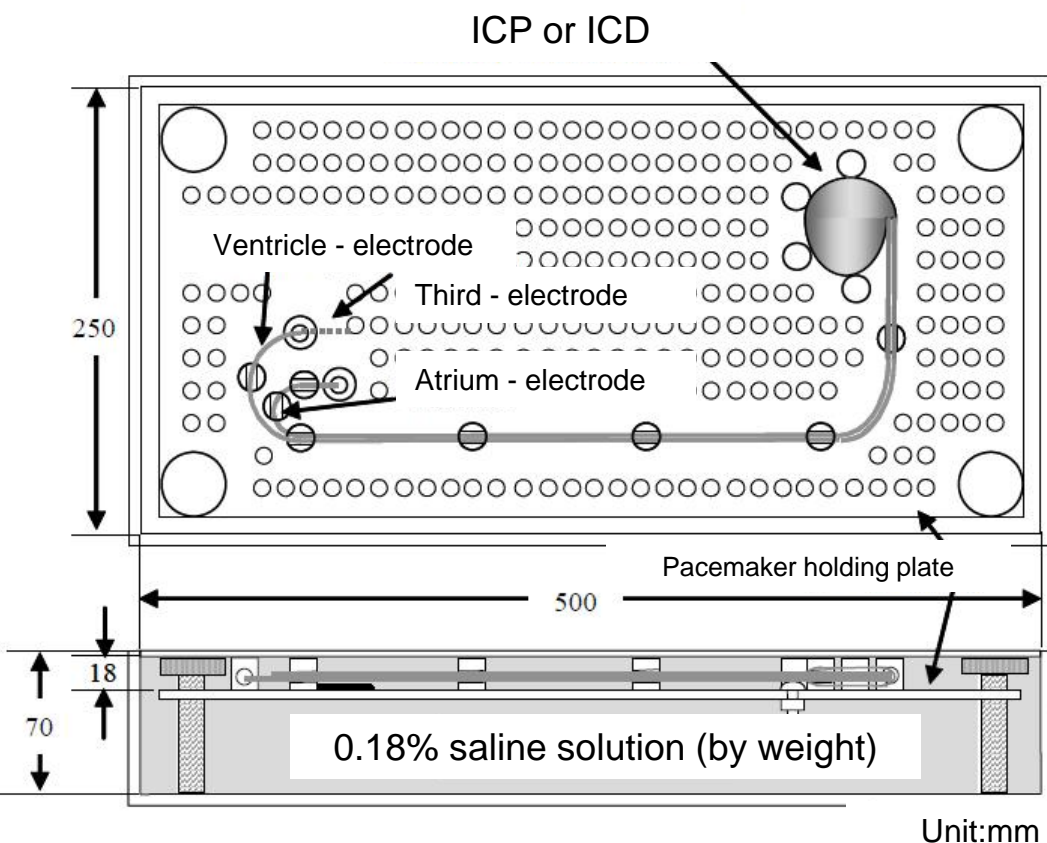


Fig. Structure of human phantom used in the test related to mobile phone terminals

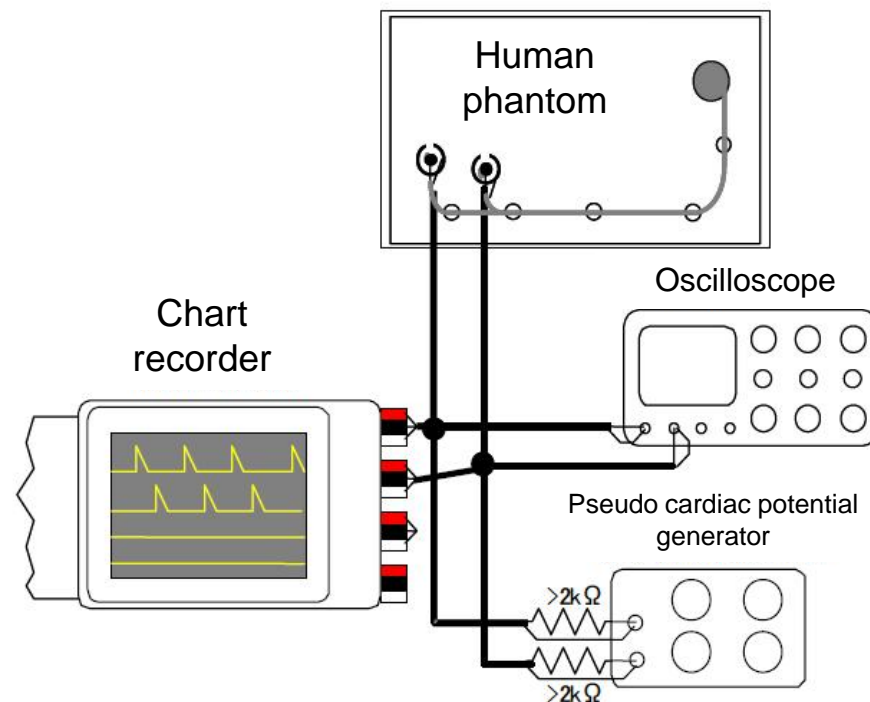


Fig. Connection of measuring equipment



# Investigation Results (1)

## 2G Mobile Phone

\* Maximum distance at which an effect is detected.

Subject	Implanted Cardiac Pacemaker (ICP)	Implanted Cardioverter Defibrillator (ICD)
800MHz-band PDC (FY 2000)	14 cm	2 cm
1.5GHz-band PDC (FY 2000)	15 cm	1 cm
CDMA (FY 2000)	6 cm	Investigated only with a dipole antenna (1.5 cm)

## 3G Mobile Phone

Subject	ICP	ICD
DS-CDMA (FY 2000)	7 cm	No effect
CDMA2000 1X/CDMA2000 1X EV-DO (800MHz-band) (FY 2004)	8 cm	2 cm
CDMA2000 1X/CDMA2000 1X EV-DO (2GHz-band) (Card Type) (FY 2004)	1 cm	No effect
800MHz-band W-CDMA (FOMA) (FY 2005)	3 cm	No effect
1.7GHz-band W-CDMA (FOMA) (FY 2006)	Less than 1 cm	No effect
1.7GHz-band W-CDMA (HSDPA) (EMOBILE) (FY 2007)	No effect	No effect
2GHz-band CDMA2000 (1xEV-DO Rev.A) (KDDI) (FY 2007)	1 cm	No effect

## PHS

Subject	ICP	ICD
PHS (FY 2000)	Investigated only with a dipole antenna (2 cm)	No effect

# Investigation Results (2)

## wireless card (contactless IC card) systems

\* Maximum distance at which an effect is detected.

Subject	Implanted Cardiac Pacemaker (ICP)	Implanted Cardioverter Defibrillator (ICD)
13.56MHz Wireless Card System (FY 2002)	8 cm	No effect

## Electronic Article Surveillance Equipment(EAS)

Subject	ICP	ICD
EAS (FY 2002)	280 cm	65 cm
EAS (FY 2003)	280 cm	65 cm

## RFID(electronic tag) equipment

Subject	ICP	ICD
Gated (135kHz or lower, 500kHz, and 13.56MHz) (FY2003)	50 cm	in contact
Handy (135kHz or lower, 13.56MHz, 300MHz, and 2.4GHz) (FY 2003)	15 cm	1 cm
Stationary (135kHz, 13.56MHz, 300MHz, and 2.45GHz) (FY 2004)	14 cm	6 cm
Modular (135kHz, 13.56MHz, and 300MHz) (FY 2004)	in contact	No effect
Reference: Devices for Controlled Areas (FY 2004)	70 cm	12 cm
UHF-band (950MHz) (Handy, Stationary, and Built-in) (FY 2006)	75 cm	10 cm

## wireless LAN equipment

Subject	ICP	ICD
Wireless LAN Equipment (2.4GHz and 5GHz) (FY 2003)	6 cm or less	No effect

- The measurements were made under severe conditions in which the radio wave transmission from a mobile phone terminal was adjusted to the maximum and the sensitivity of the cardiac pacemaker to the highest, etc.
- The current guideline of 22 cm is determined as 15 cm multiplied by the square root of 2, with a 2 times safety considered. 15cm is the maximum affecting distance in a specific combination. (PDC mobile phone and some cardiac pacemakers )
- If the guideline is followed, no effect is detected.
- Deviating from the guideline does not necessarily cause an immediate effect.

## Reference

**Investigation of the Effects of Radio Waves on Medical Equipment, etc**  
<http://www.tele.soumu.go.jp/e/ele/medical/investigative.htm>

# **IMPROVING THE LITERACY ON THE SAFETY OF RADIO WAVES**

## 1. Preparing and Distributing Brochures

We are preparing brochures on the safety of radio waves and distributing them through the Regional Bureau of Telecommunications, National Consumer Affairs Center of Japan, etc.

## 2. Providing Information on the Web Site

The MIC Web page at the following URL provides information on possible health effects of radio waves.

<http://www.tele.soumu.go.jp/j/ele/body/index.htm>

The English version is at the following URL.

<http://www.tele.soumu.go.jp/e/ele/body/index.htm>

## 3. Offering Seminars

We are offering seminars on the safety of radio waves across the country.



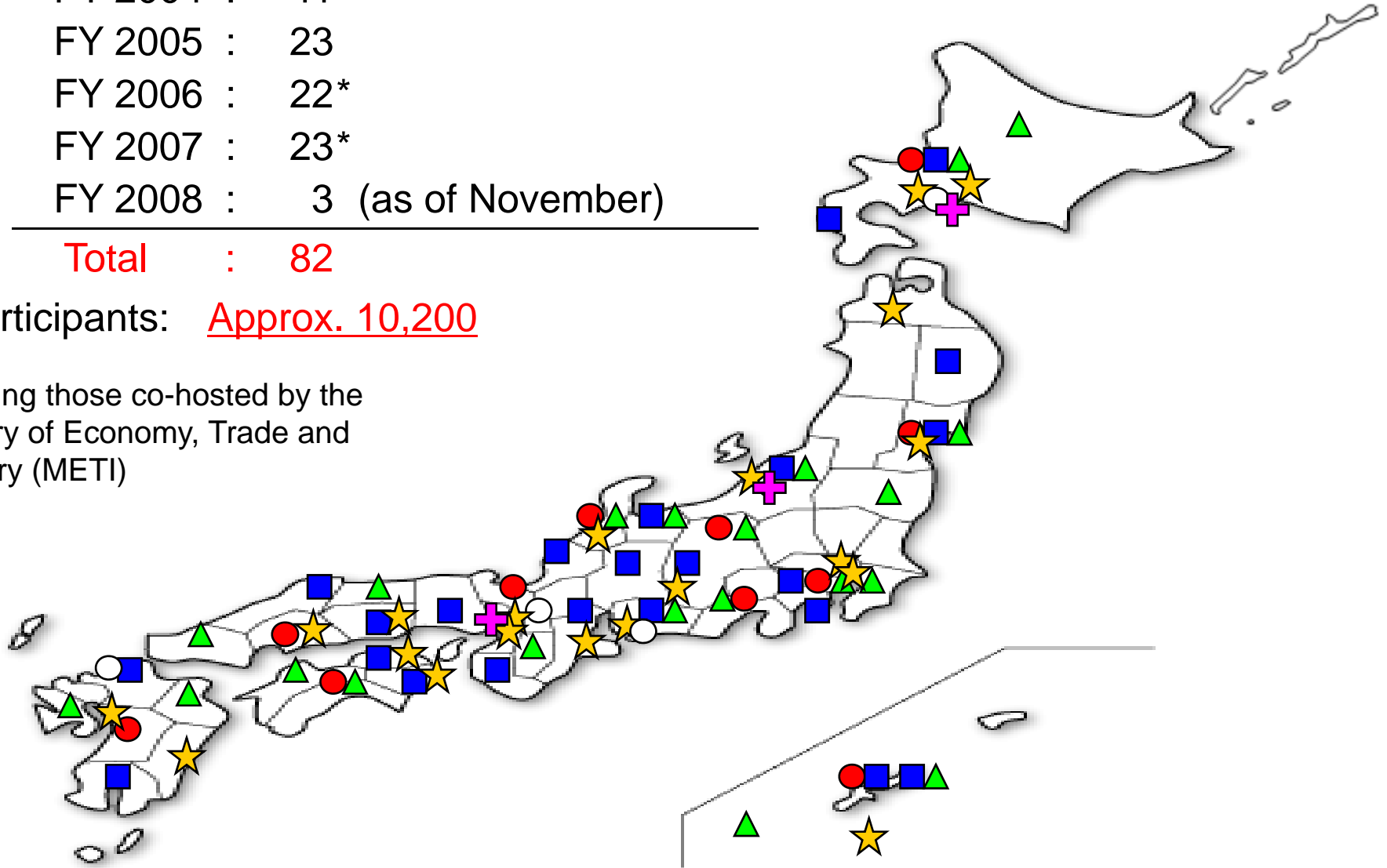
# Number of Seminars on the Safety of Radio Waves

FY 2004	:	11
FY 2005	:	23
FY 2006	:	22*
FY 2007	:	23*
FY 2008	:	3 (as of November)

**Total** : 82

Total Participants: Approx. 10,200

\*Including those co-hosted by the Ministry of Economy, Trade and Industry (METI)



● : Fiscal 2004;    ■ : Fiscal 2005;    ▲ : Fiscal 2006;    ★ : Fiscal 2007;    + : Fiscal 2008;    ○ : Co-hosted by METI

# Partial Amendments of the Radio Law

During the 169th Session of the Diet (in 2008), partial amendments of the Radio Law were unanimously approved with revisions by members at the General Affairs Committee in the House of Representatives.

## [Usage of Spectrum Fee (Article 103-2, Paragraph 4 of the Radio Law)]

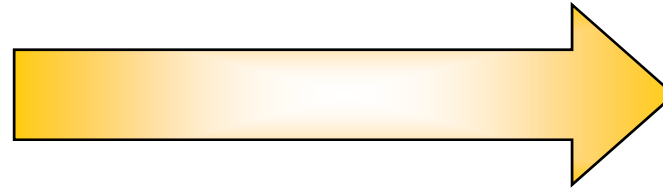
The following provisions are added to the tasks the Minister of MIC performs for the direct beneficiary of a radio station in order to ensure proper usage of radio waves.

- Investigation of the effects of radio waves on the human body
- Assistance required for activities to ensure the efficient usage of radio waves or improving literacy regarding the usage of frequency bands and protection of the human body to prevent adverse effects of radio waves on the human body

**Conducting further investigation and activities on the effects of radio waves on the human body**



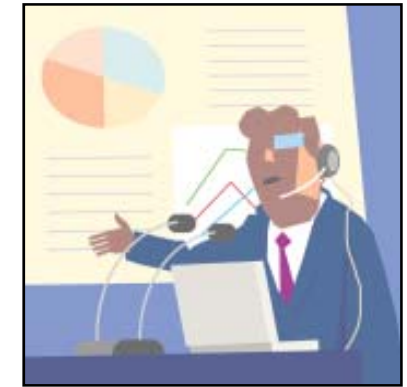
**For people concerning  
about the safety of  
mobile phone  
terminals and base  
stations  
(general)**



Materials on the  
safety of radio  
waves



Materials on the  
effects on medical  
equipment



Offering seminars  
(20 per year)



Telephone consulting  
Petition correspondence



## Medical Professionals



### Medical Equipment Cardiac Pacemakers

Coordination with Ministry of Health, Labor and Welfare

Coordination with the organizations concerned

Explanatory Materials

- Materials on the safety of radio waves
- Materials on the effects on medical equipment
- Notices

Offering seminars (10 per year)

## Transportation Operators



### Medical Equipment Cardiac Pacemakers

Coordination with Ministry of Land, Infrastructure, Transport and Tourism

Coordination with the organizations concerned (e.g., railway, bus)

Offering seminars (10 per year)

## Operators Concerned



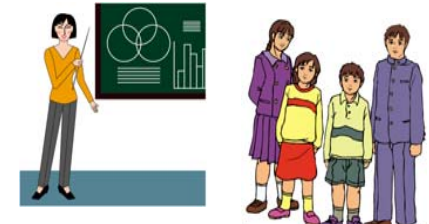
### Base Stations Mobile Phone Terminals

Coordination with Ministry of Economy, Trade and Industry

Coordination with the organizations concerned

Offering seminars (10 per year)

## Educational Institutions



### Correct Knowledge on Radio Waves

Coordination with Ministry of Education, Culture, Sports, Science and Technology

Coordination with the organizations concerned

Distributing Explanatory Materials

- Materials on the safety of radio waves
- Materials on the effects on medical equipment
- Notices
- Teaching materials

**Analyzing the current status of education and motivation activities, consulting and petition, and reflecting the results in the education and motivation activities for improving literacy**

**Thank you for your kind attention!**