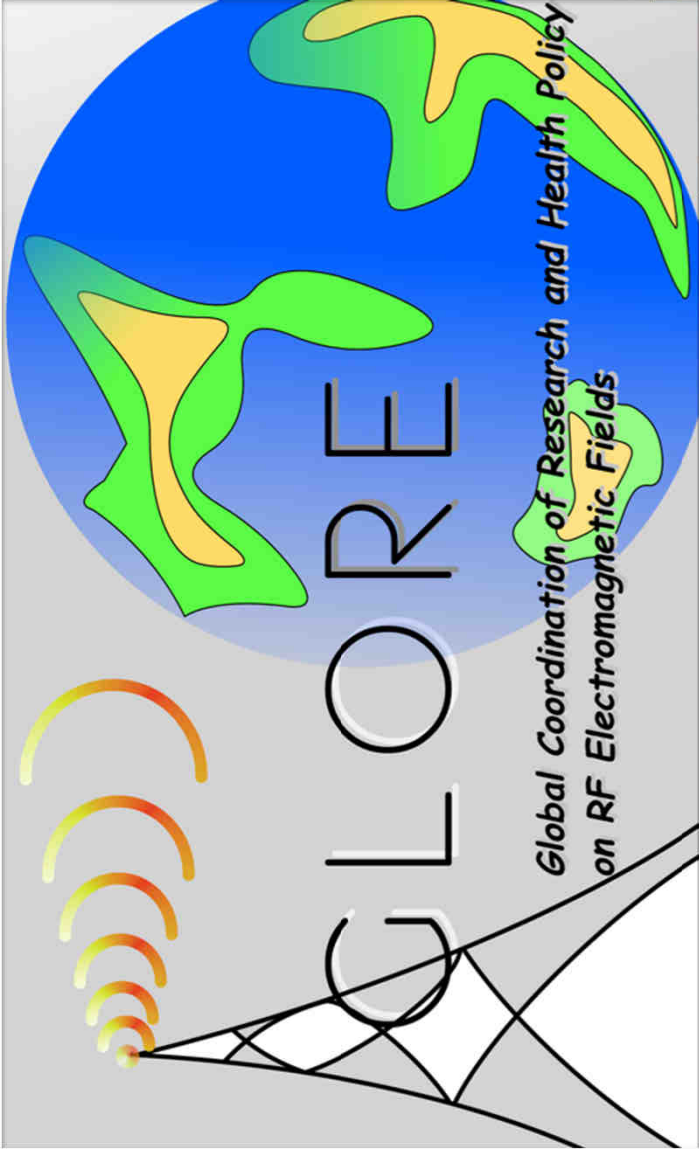


20<sup>ème</sup> Journée Interactions Ondes-Personnes  
Jeudi 19 Décembre 2013



# International coordination of research and health policy on RF EMF

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# JAPAN



- A new research programme was initiated by MIC = Ministry of Posts and Telecommunication/Ministry of Internal Affairs and Communications
- The purpose of the new programme is to improve RF safety guidelines and strengthen their rationale.
- The new topics are:
  - biological effects of THz wave
  - health effects of localized exposure above 6 GHz
  - perception of the contact current in the IF range

# Recently completed projects



Effects of *in-utero* and pre-weaning exposure of rats to multi-frequency RF signals (Fujiwara) Nagoya



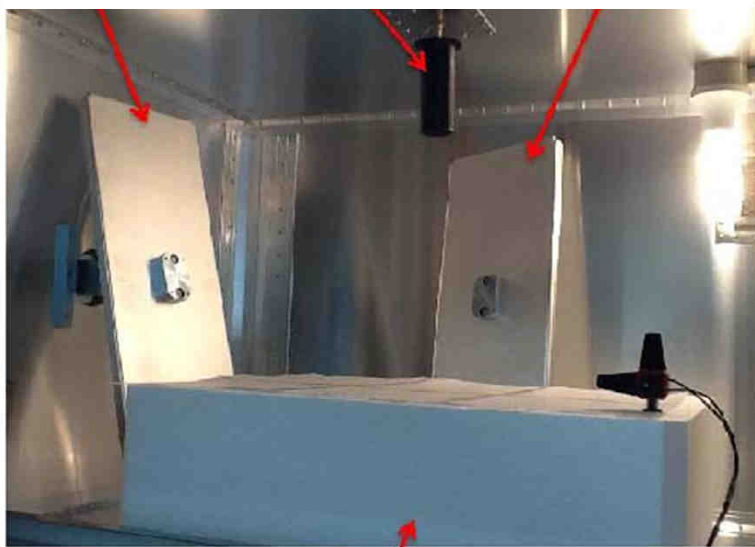
- 8 signals: Wi-Fi, CDMA, WiMAX, etc.
- 0.4 and 0.08 W/kg
- Body and organ weight
- development and function of neurological system

**No effects**

# Recently completed projects



*In-vivo* and *in-vitro* studies on the effects on immune functions at 2 GHz, CDMA (Ishii) Tokyo



*in vivo*: **no effects**

*in vitro*: **detrimental effects** on chemotaxis, phagocytosis, and T-cell-dependent antibody responses.

**beneficial effects** on Th1/Th2 balance.  
→ need for replication.

# Recently completed projects



Prenatal whole-body exposure and hematopoietic activity in rats (Murono) Tokyo



Exposure of pregnant rats, at 2.14 GHz (CDMA), 0.20 W/Kg did not affect the hematopoiesis of their offsprings.

Endpoints: stem cells, micronuclei, etc.

**No effects**

# KOREA



- Ministry of Science, ICT & Future Planning (MSIP)
  - Coordination, research, and communication
- National Radio Research Agency (RRA)
  - regulations , international cooperation
- Korea Communications Agency (KCA)
  - Exposure limit compliance testing

# Standards



- EMF exposure limits were established and effective from 2001
- New standard implemented > August 2014

**◆ SAR limits in Korea** < Before 2013 >♪

Frequency range	Specific absorption rate (W/kg)	Remarks
100 kHz – 10 GHz	1.6	Averaged over 1g

↓

< After 2013 >♪

Frequency range	Distrib.	Specific absorption rate (W/kg)		
		Whole body	Head/Body	Limb
100 kHz – 10 GHz	General public	0.08	1.6(1g)	4(10g)
	Occupational	0.4	8(1g)	20(10g)



# 2 classes of cell phones



(Unit: W/kg, 1g tissue average)

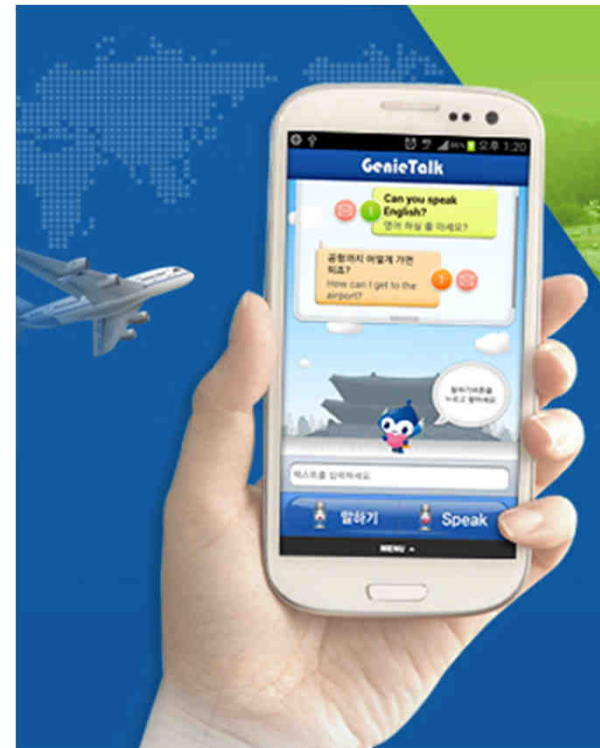
Class	Criteria
Class 1	SAR value $\leq 0.8$
Class 2	$0.8 < \text{SAR value} \leq 1.6$



# Research



- Korean Institute of Electromagnetic Engineering and Science (KIEES)
- Electronic Telecommunication Research Institute (ETRI)



# Research projects



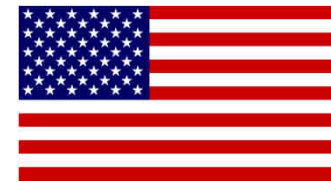
- Effects of RF Exposure on Neuro-degenerative Disease including Alzheimer disease (Yun-Sil Lee)  
*Ewha Womans Univ.*
- Effects of Combined RF exposure (836.5 MHz & 1950 MHz) on
  - cell cycle progression
  - stress response (HSP27, ERK)
  - oxidative stress (ROS, GSH, SOD)
  - Reactive Oxygen Species in neuronal cells
  - $\beta$ -amyloid-induced toxicity in neuronal cells(Jae-Seon Lee and Myeong-Jin Park) *Korea Inst. of Radiological & Med Science*



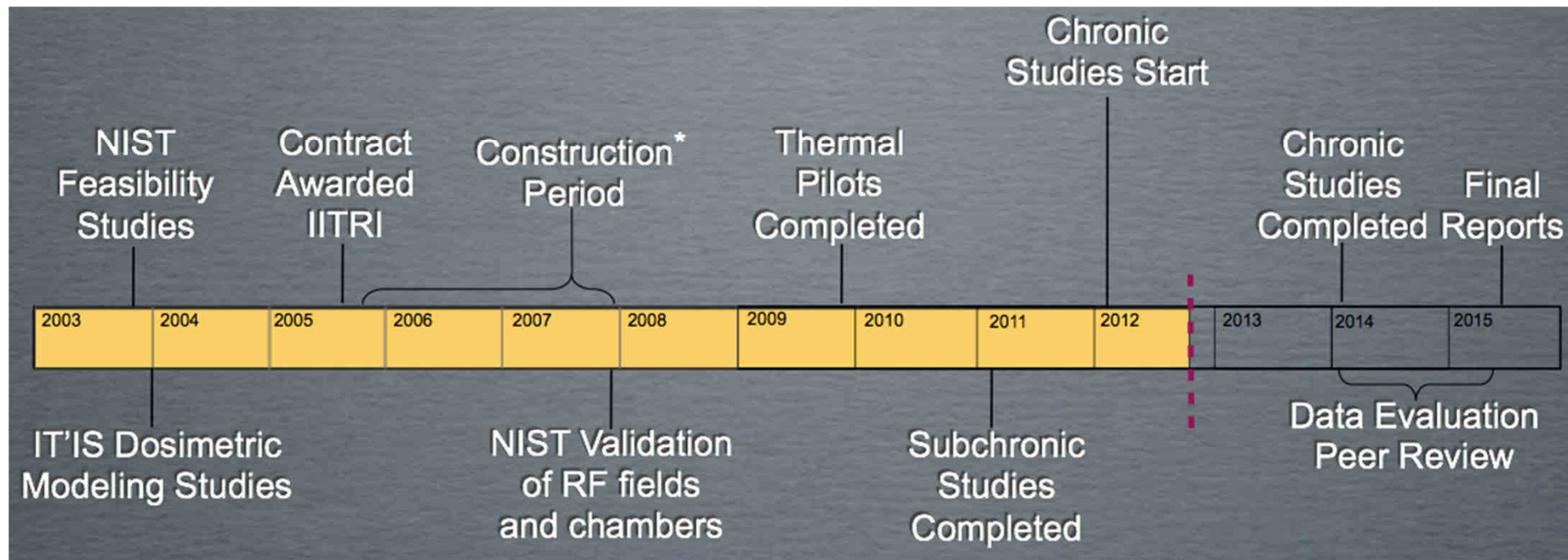
# Update on the NTP Toxicology and Carcinogenicity Studies of RF

National Institute of Environmental Health Sciences  
IITRI Chicago (D. McCormick)





# NTP RF Study: timeline



Intermittent exposure for 18hr 20min /day  
Rats – 900 MHz, GSM & CDMA (gestation/lactation)  
Mice – 1900 MHz, GSM & CDMA  
Interim time point at 19 weeks (n = 15)  
and study termination at 110 weeks of age (n = 90)  
**Micronucleus, comet assay, and clinical pathology**

## NTP RF Study: Prechronic Study Results



- B6C3F<sub>1</sub> mice
  - No effects at SAR < 12 W/kg
- Sprague-Dawley rats
  - Decrease in body weights  $\geq 9$  W/kg for both GSM and CDMA
  - Increase in T at SAR  $\geq 9$  W/kg

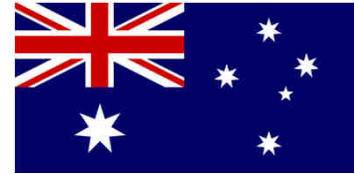


# USA: exposure limits



- FCC exposure limits adopted in 1996 based on IEEE and NCRP
- ICNIRP 1998 and IEEE 2006
  - same SAR basic restriction
  - but lots of differences in the details
  - frequencies below 10 MHz
- Update of the FCC exposure limits or keep the same?

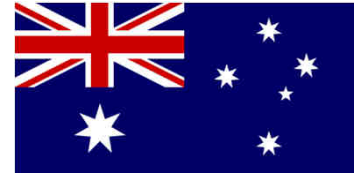
# AUSTRALIA (1/2)



- Australian research is funded through the National Health and Medical Research Council of Australia (NHMRC) from a levy on the telecommunications industry.
- The NHMRC is funding the Australian Centre for Electromagnetic Bioeffects Research (2012-2017).
- <http://www.nhmrc.gov.au/grants/outcomes-funding-rounds/nhmrc-funded-research-effects-electromagnetic-energy/nhmrc-grants-eme>



# AUSTRALIA (2/2)



- Main research topics:
  - psychological outcomes of RF exposures,
  - dosimetry studies and exposure assessments,
  - thermal regulation,
  - RF and EEG.
- ARPANSA Review of scientific literature on RF health effects (update of Radiation Protection Series No 3, RPS 3)
- ACIF (Communications Alliance) Industry Code of Practice has a revised industry code of practice on Mobile Base Station Deployment (ACIF C564:2011)

# CHINA



- National EMF Bioeffects Project (2011-2015): 3.3 M€
- 6 main topics:
  - electromagnetic biophysics
  - bioelectromagnetics
  - Neuroscience
  - reproductive biology
  - genetic toxicology
  - epidemiology & occupational health
- 12 universities and other institutions
- 30 principal investigators



# CONCLUSION

- Main research activity in Japan, Korea and China
- Lack of coordination of research at the international level
- Steady global decrease in research fundings
- Very heterogeneous quality of the experimental studies (physics and biology)
- Gradual move from “GSM” to “3G” studies
- No recent new experimental findings...
- Increased focus on:
  - wireless power transfer
  - higher carrier frequencies > 6 GHz
- No major evolution of RF exposure limits to foresee (awaiting the RF ICNIRP revised guidelines in 1-2 years time)



Joyeux Noël!