

## Comments from Korea

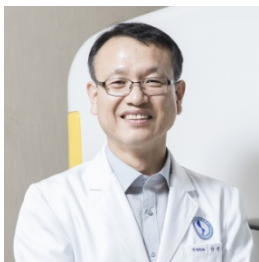
EMF Research Committee of Korean Institute of  
Electromagnetic Engineering and Science (KIEES)

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## Brief introduction of the presenter

Young Hwan AHN, MD PhD



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Director, Ajou University Hospital Parkinson Center

Ajou University School of Medicine, Suwon, Korea

- 2008~present Member of the EMF Research Committee of Korean Institute of Electromagnetic Engineering and Science (KIEES), KOREA
- 2017~Present President, the Korean Society of Stereotactic and Functional Neurosurgery
- 2017~Present Continental Vice president, the World Society of Stereotactic and Functional Neurosurgery
- 2014~2015 President, Society of Korean Gamma Knife Radiosurgery

## 1. A draft report, 2016

### **Report of Partial Findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposures)**

Draft 5-19-2016

Several important comments were already appeared in this draft. Since then, those comments have been reviewed and discussed.

# 1. A draft report, 2016

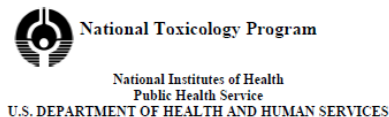
# 2. Two draft NTP Technical Reports on Cell Phone RF Radiation.

NTP TECHNICAL REPORT  
ON THE  
TOXICOLOGY AND CARCINOGENESIS  
STUDIES IN Hsd:SPRAGUE DAWLEY SD RATS  
EXPOSED TO WHOLE-BODY RADIO FREQUENCY  
RADIATION AT A FREQUENCY (900 MHz) AND  
MODULATIONS (GSM AND CDMA) USED BY  
CELL PHONES

Scheduled Peer Review Date: March 26 to 28, 2018

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NTP TR 595

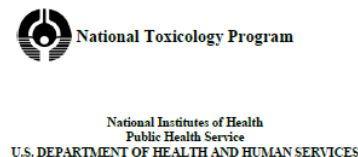


NTP TECHNICAL REPORT  
ON THE  
TOXICOLOGY AND CARCINOGENESIS  
STUDIES IN B6C3F1/N MICE EXPOSED  
TO WHOLE-BODY RADIO FREQUENCY RADIATION  
AT A FREQUENCY (1,900 MHz) AND MODULATIONS  
(GSM AND CDMA) USED BY CELL PHONES

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NTP TR 596



# 3. An article (Wyde ME et al, Bioelectromagnetics, Mar 2018)

Accepted for publication by Bioelectromagnetics journal (January 30, 2018).  
Advanced distribution for use at peer review of draft NTP technical reports, March 26-28, 2018

Effect of RFR on Body Temperature in Rodents

Effect of Cell Phone Radiofrequency Radiation on Body Temperature in  
Rodents: Pilot Studies of the National Toxicology Program's Reverberation  
Chamber Exposure System

# Introduction

## • Tumor of nervous system : classification (brain)

**incidence**

42 %

- Primary tumors of the brain

- Gliomas

- Lowest grade tumors (WHO grade I)

- Pilocytic astrocytoma, Subependymal giant cell astrocytoma, Protoplasmic astrocytoma, Ganglioglioma
      - Xanthomatous astrocytoma, Subependymoma

- Lower grade malignancies (WHO grade II)

- Fibrillary (gemistocytic, protoplasmic) astrocytoma, Ependymoma
      - Oligodendroglioma, Mixed oligo-astrocytoma, Optic nerve glioma

- Higher-grade malignancies (WHO grade III)

- Anaplastic astrocytoma,
        - Anaplastic oligodendroglioma,
        - Anaplastic mixed glioma

(15 %)

- Highest-grade malignancies (WHO grade IV)

- Glioblastoma multiforme
        - Gliosarcoma
        - Gliomatosis cerebri

36 %

- Meningioma : Benign, Atypical, Malignant

- Primitive neuroectodermal tumor (PNET) : Medulloblastoma, Ependymoblastoma, Pineoblastoma

15 %

- Pituitary tumors : Pituitary adenoma, pituitary carcinoma, craniopharyngioma, Rathke's cleft cyst

- Pineal tumors : pineal cyst, pineocytoma, pineoblastoma, Mixed germ cell tumor, Pineal gliomas, Pineal teratoma

- Choroid plexus tumors : Choroid plexus papilloma, Choroid plexus carcinoma

- Other, more benign primary tumors : Neurocytoma, Dysembroplastic neuroepithelial tumor (DNT), Lipoma, Hemangioblastoma, Hamartoma, Teratoma

8 %

- Tumors of nerves and/or nerve sheaths : Neuroma, Schwannoma, Neurofibroma

- Cysts : Colloid cyst, Arachnoid cysts, Dermoid, Epidermoid, Rathke's cleft cyst, Pineal cyst

- Other primary tumors, including skull base ; chondroma, chordoma, sarcoma, gliosarcoma, chondrosarcoma, rhabdomyosarcoma

- Primary Central Nervous System Lymphoma (PCNSL)

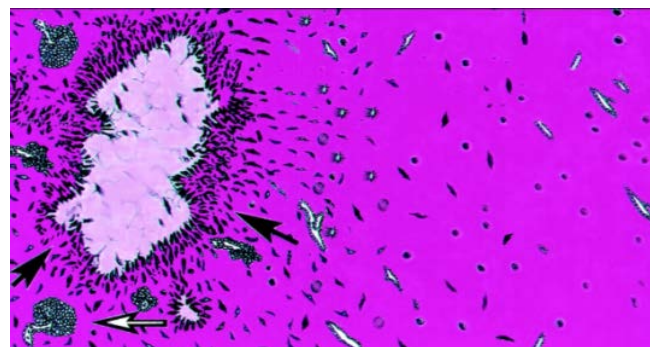
- Metastatic brain tumors and carcinomatous meningitis

# Introduction

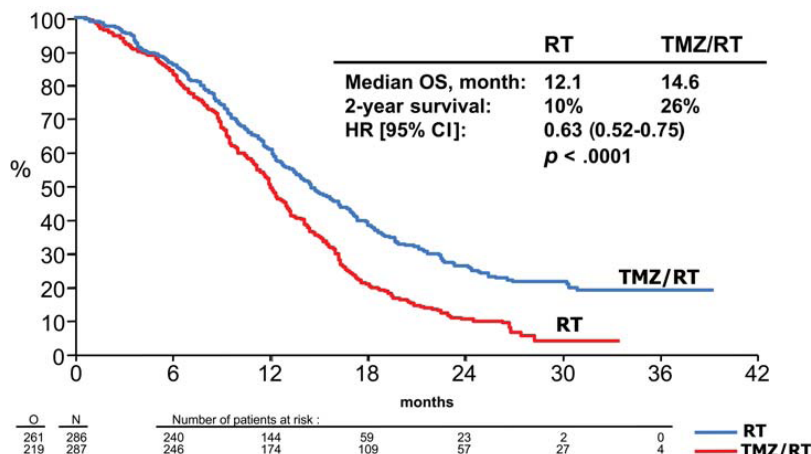
- Tumor of nervous system : classification (brain)

## 1. Glioblastoma

- The most common and **most malignant** glial tumor
- Mean age of onset 56-64 years old, more common in men
- **Biologically aggressive**
- growth pattern : spread into brain parenchyme



- Median survival **12-15 months**



Despite aggressive treatment with surgery, radiation, and chemotherapy, these tumors are **most often rapidly fatal.**

# Introduction

- Tumor of nervous system : classification (brain)

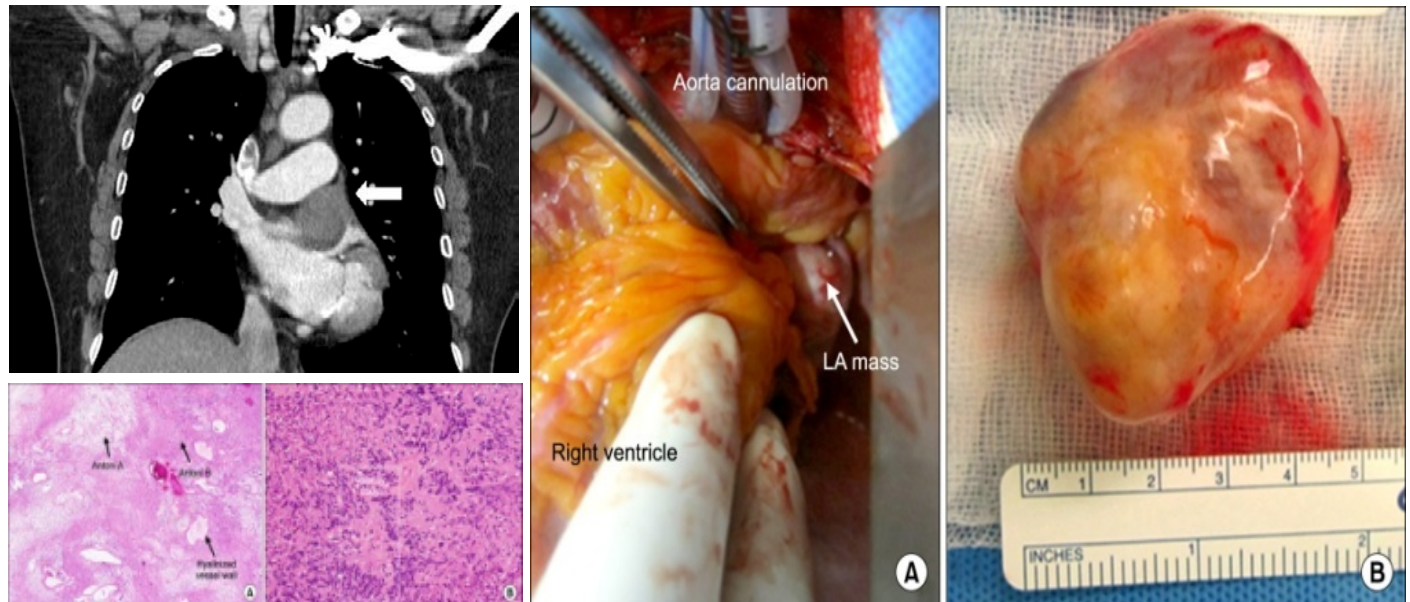
1. Glioblastoma

2. Schwannoma

- Benign tumors of nerves and/or nerve sheaths
- Neuroma, Schwannoma, Neurofibroma

3. Cardiac schwannoma

- Primary cardiac schwannoma is an **extremely rare**
- **Worldwide, only 16 cases** have been reported
- **Case report**; Female 55. chest pain at rest



# Comments

1. The scale of NTP study was the largest ever.  
The long-term carcinogenesis animal studies are important to identify human risks.

The study design was **reasonable** to perform with two groups including the sham-exposed and the RF-exposed group.

- However, the sham-exposed group is **different** from cage-control group.
- Therefore the data from the historical control group could **not** be an alternative replacing that from the sham-exposed group.



# Comments

2. Both glioma and schwannoma (including cardiac schwannoma) are tumors of nervous system.
- Even though cardiac schwannoma is extremely rare in human, the NTP study reports have drawn special attention to tumors of the nervous system.
  - If life-span RF exposure may cause increased incidence of tumors of the nervous system, regardless of statistical significance, we have to pay attention to the carcinogenic potential of RFR in human.

# Comments

3. This NTP study was well organized.
  - Well organized trial does not guarantee the success of the study, especially in *in vivo* experiment.
  - The **survival** rate of the sham-exposed group would be the most significant drawback of this study.

# Comments

4. The **post-NTP study** would be necessary to draw a meaningful conclusion.

# Thank you for your attention

The EMF Research Committee of Korean Institute of Electromagnetic Engineering and Science (KIEES), KOREA

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- Dr. Hae Jun Lee (Korea Institute of Radiological & Medical Science)
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