

# 전자파에 대한 생체 반응 연구

서정선 (서울의대 유전자이식연구소)

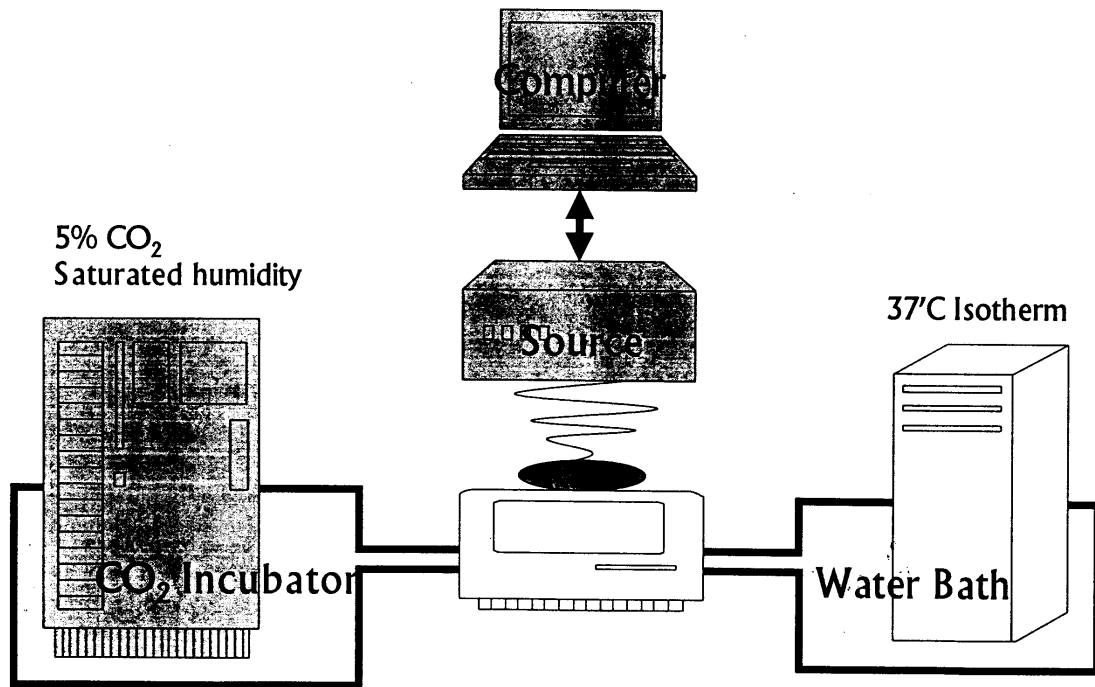
## In Vitro Studies at 836.55MHz

PI Name	Study Subtype	Hypothesis Tested	SAR	Dose
Donnellan, M.	Cell proliferation and DNA synthesis	835 MHz (FM) exposure on proliferation of a Mast cell line	8.1 mW/cm <sup>2</sup>	20 minutes 3x/day for 7 days
French, P.W.	Cell Proliferation and DNA Synthesis	835 MHz (FM) exposure on proliferation in neuronal cells in culture	8.1 and 40mW/cm <sup>2</sup>	20 minutes 3x/day for 7 days
Penafiel, L.M.	mRNA, Enzyme & Hormone Level Changes	835 MHz (TDMA & CW) exposure on ODC activity in cultured cells	2.5 W/kg	8 hours
Stagg, R.	Cell Proliferation and DNA Synthesis	836.55 MHz (TDMA) exposure on proliferation in glial & fibroblast cells in culture	0.23, 2.3, or 23 mW/kg	
Cain, C.D.	mRNA, Enzyme & Hormone Level Changes	836.55 MHz (TDMA) exposure on ODC activity and polyamine levels in cultured cells	0.78 and 7.8 mW/kg	4 hours (20 minutes on / 20 minute off) repeating
Ivaschuk, O.	mRNA, Enzyme & Hormone Level Changes	836.55 MHz (TDMA) exposure on c-fos & c-jun expression in cultured cells	0.41, 4.1, or 41 mW/kg	20, 40, and 60 min
Li, J.R.	mRNA, Enzyme & Hormone Level Changes	836.55 MHz (FM) exposure on p53 protein levels & morphology in culture cells	0.9 and 9.0 W/kg	2 hours

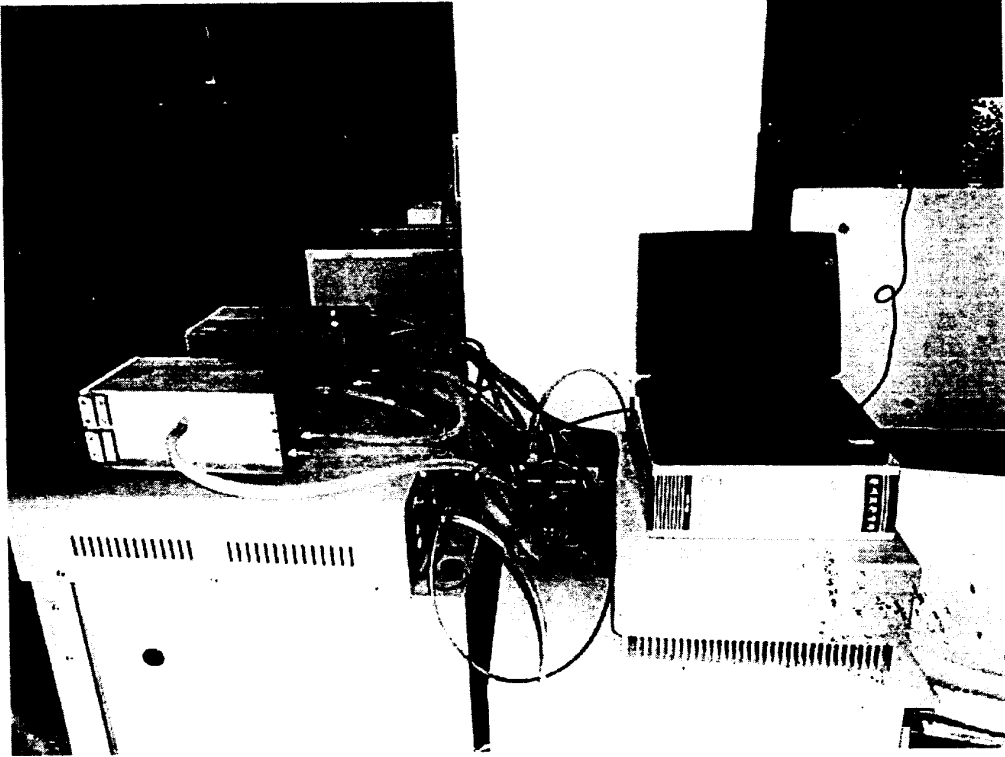
## In Vitro Studies at 1.765 GHz

PI Name	Study Subtype	Hypothesis Tested	SAR	Dose
Eberle, P	Chromosome Aberrations and Micronuclei formation	440, 900, 1800 MHz (C,D & E Net GSM) exposure on micronuclei, SCE, proliferation & chromosome aberrations in human lymphocytes	6.2 and 29.4 W/kg	40-72hrs
Fitzner, R.	Cell Proliferation and DNA Synthesis	380, 900, 1800 MHz (C, D & E Net GSM) exposure on proliferation of human lymphocytes in culture	1.7W/kg	24hrs
Obe, G.	Cell Proliferation and DNA Synthesis	380, 900, 1800 MHz (C,D & E Net GSM) exposure on proliferation of human lymphocytes in culture		48-64
Antonopoulos, A.	Chromosome Aberrations and Micronuclei formation	380, 900, 1800 MHz (C,D & E Net GSM) exposure on SCE and proliferation in human lymphocytes		48-64H

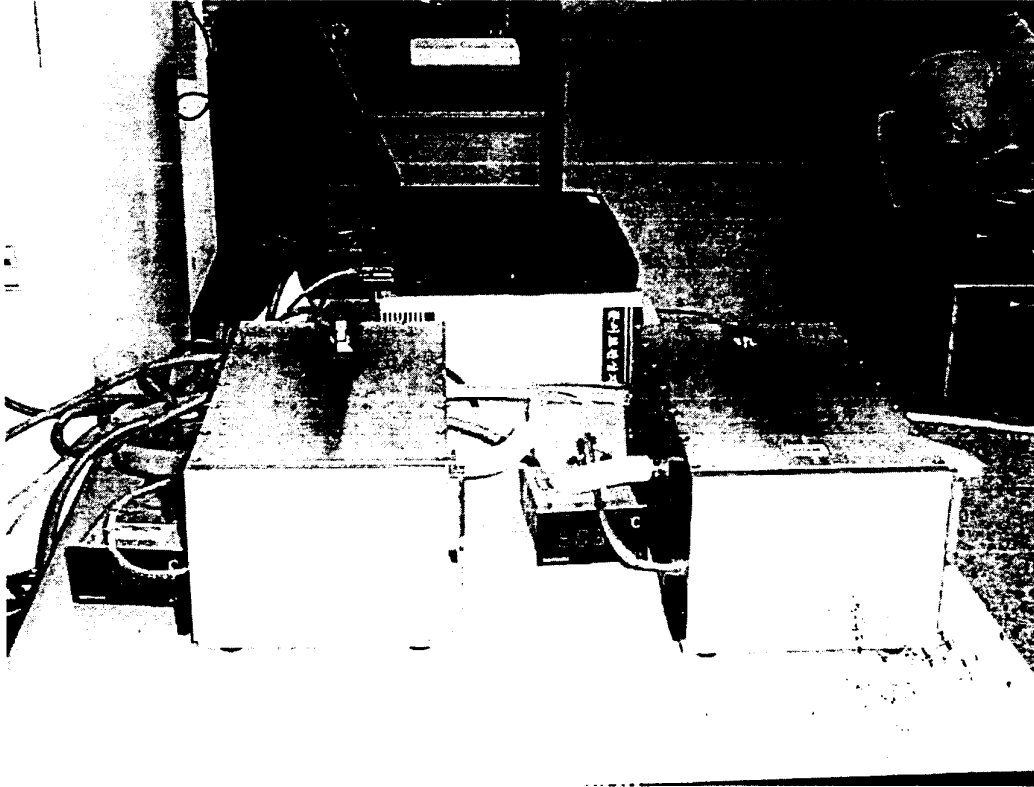
# In Vitro RF Exposure System



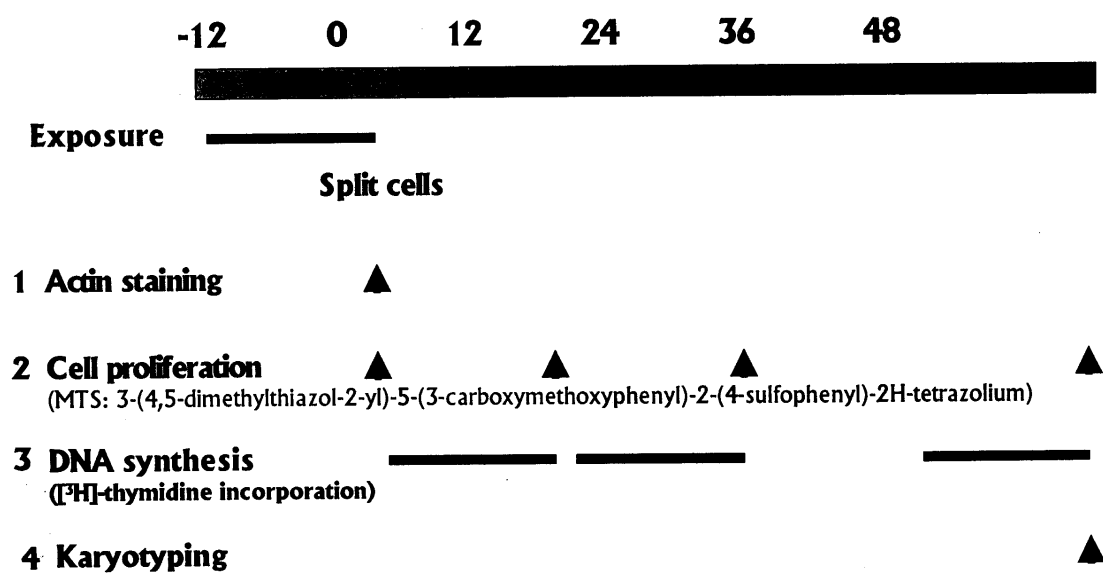
# 1.765GHz RF In Vitro Exposure System



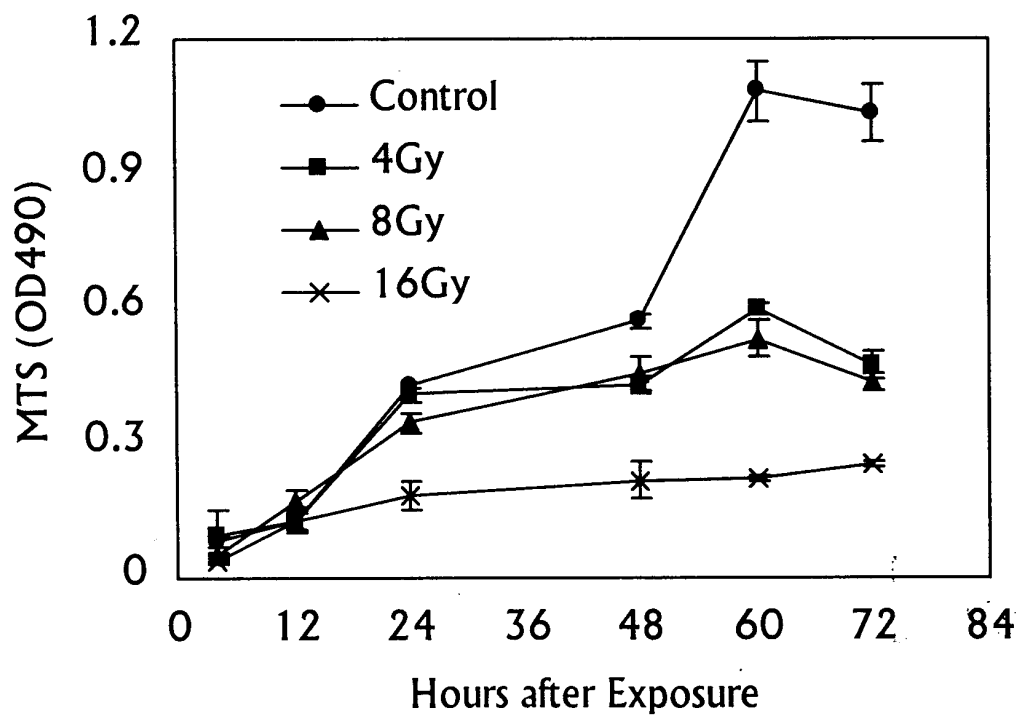
## 1.765GHz RF In Vitro Exposure System



## Experiment Scheme

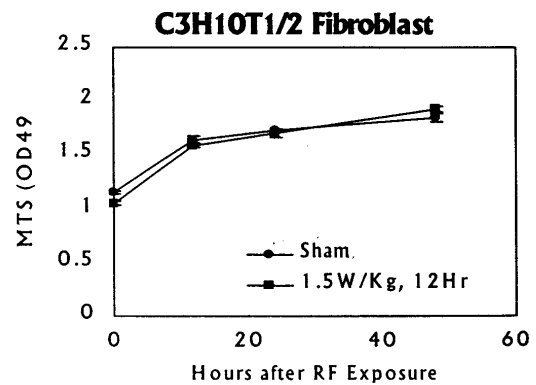
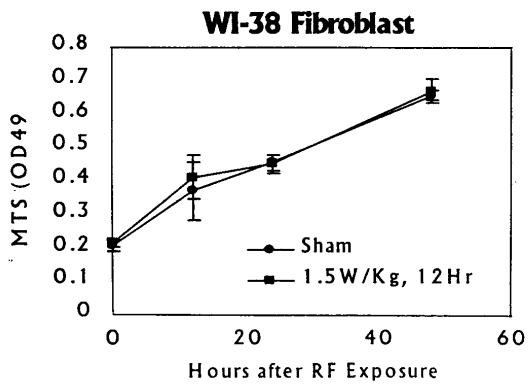
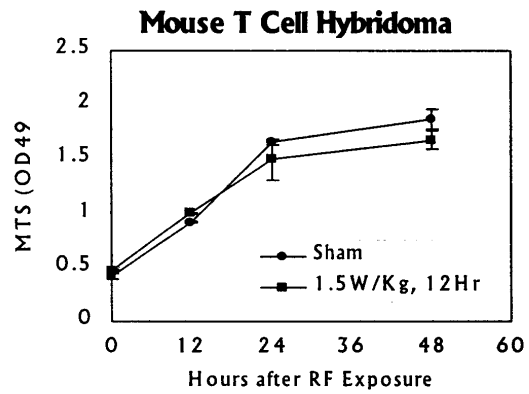
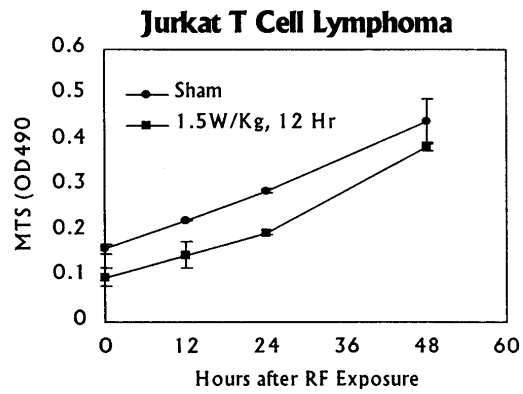


Cell proliferation of Jurkat Human T Cell Lymphoma after Ionizing Radiation

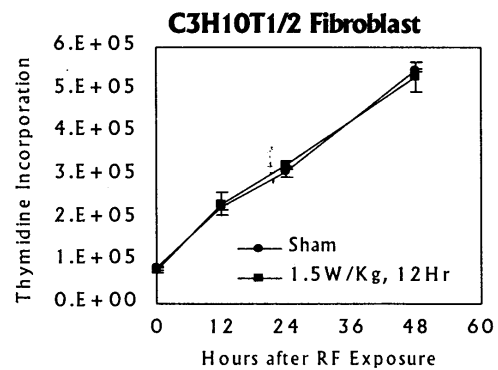
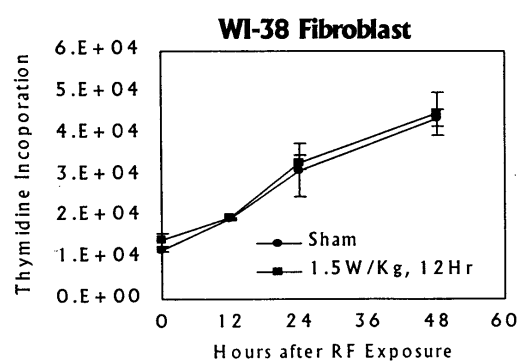
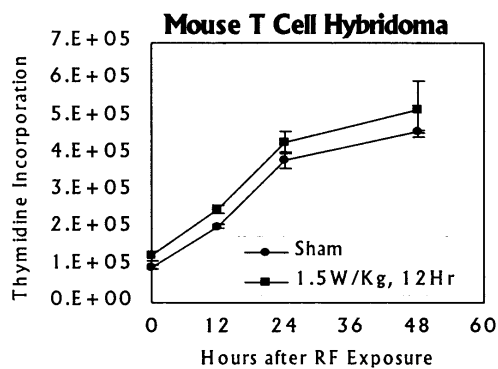
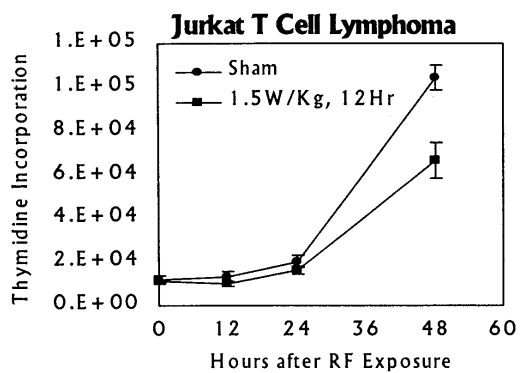




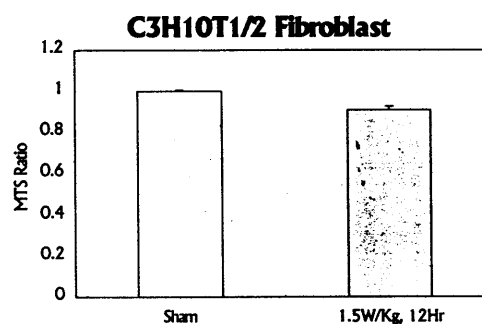
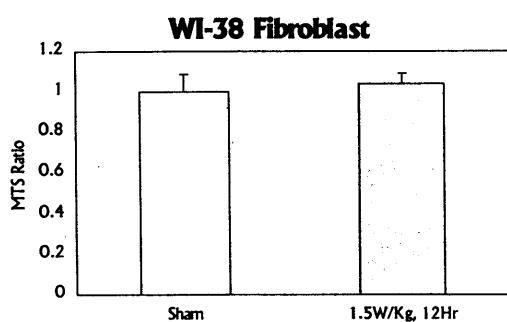
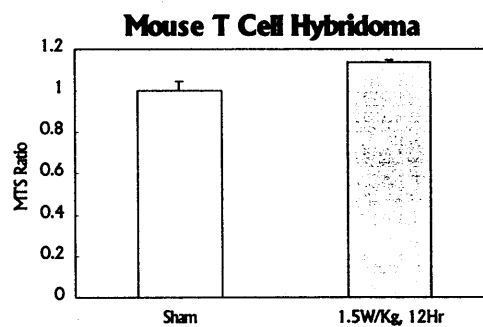
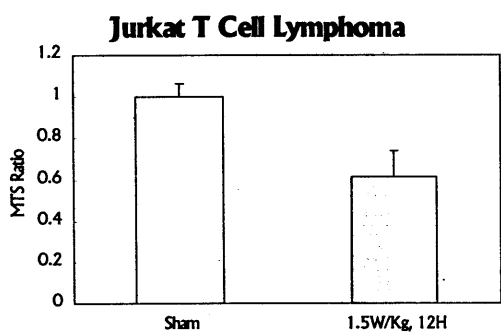
# Cell Proliferation after 1.765GHz RF Exposure at 1.5W/Kg for 12 Hours



# DNA Synthesis after 1.765GHz RF Exposure at 1.5W/Kg for 12 Hours



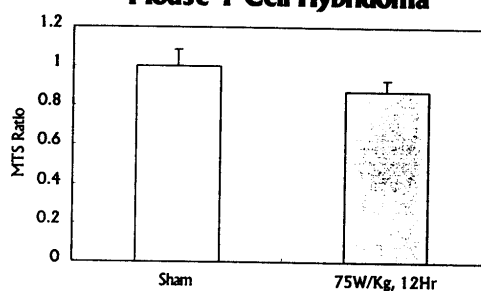
# Cell Proliferation after 1.765GHz RF Exposure at 1.5W/Kg for 12 Hours



# Cell Proliferation after 1.765GHz RF Exposure at 75W/Kg for 12 Hours

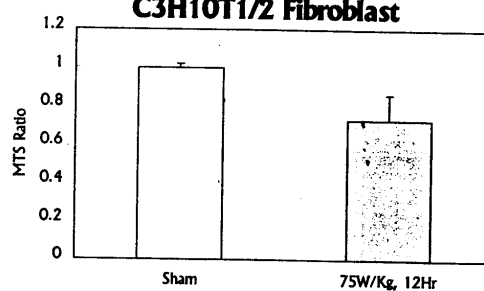
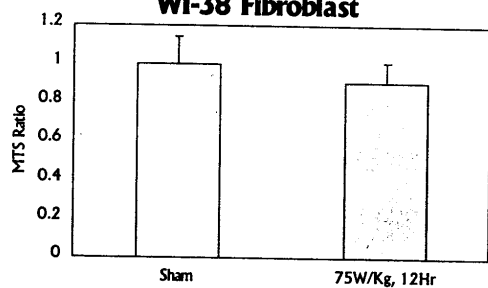
### Jurkat T Cell Lymphoma

### Mouse T Cell Hybridoma



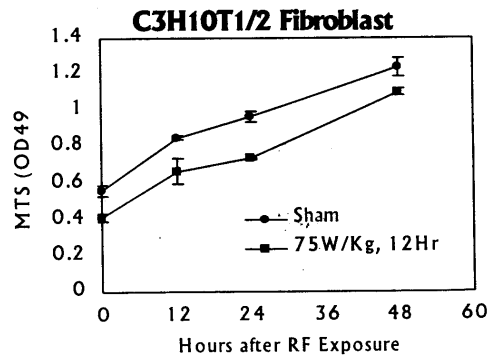
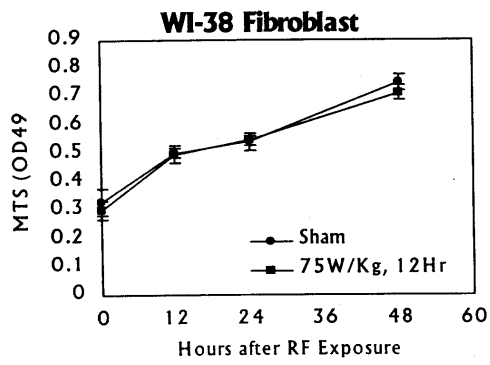
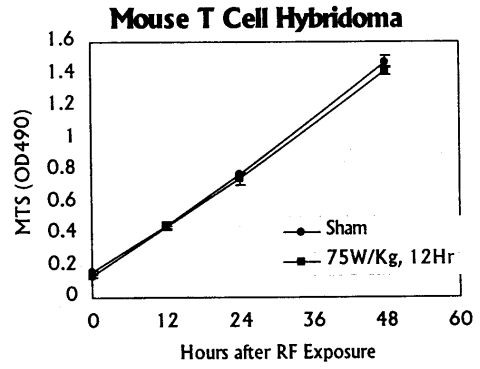
### WI-38 Fibroblast

### C3H10T1/2 Fibroblast



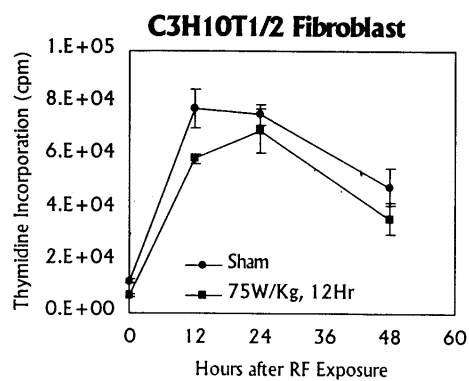
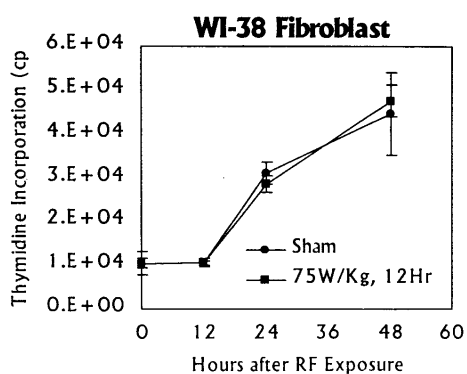
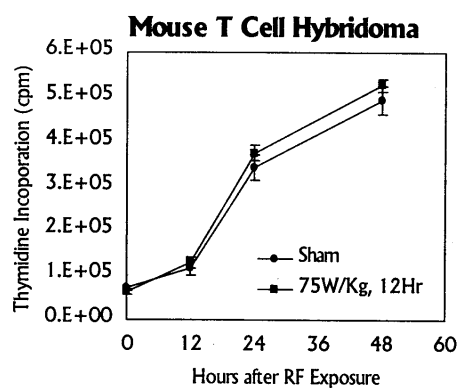
# Cell Proliferation after 1.765GHz RF Exposure at 75W/Kg for 12 Hours

### Jurkat T Cell Lymphoma

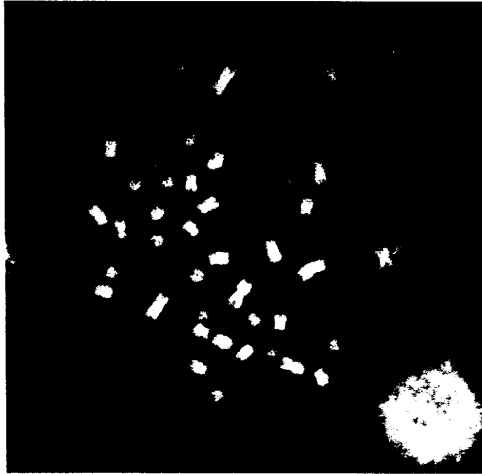


# DNA Proliferation after 1.765GHz RF Exposure at 75W/Kg for 12 Hours

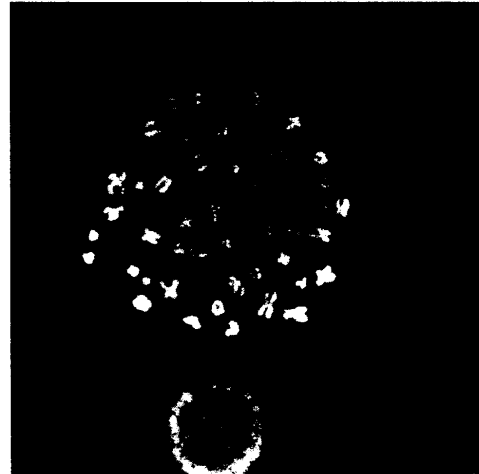
### Jurkat T Cell Lymphoma



Karyotyping of Jurkat Human T Cell Lymphoma after  
1.765GHz RF Exposure

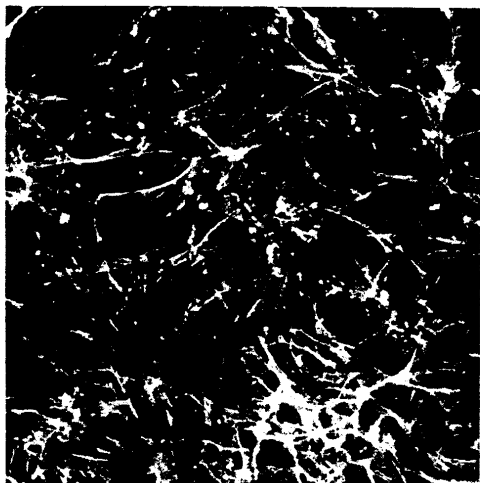


Sham

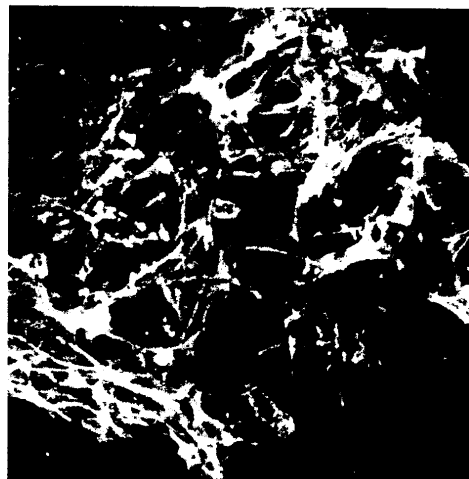


12Hr at 75W/Kg

Actin Polymerization after 1.765GHz RF Exposure in C3H10T1/2 Mouse Fibroblasts



Sham



12Hr at 75W/Kg



## Summary

- 세포용 전자파 발생장치 제작  
1.765 GHz용 전자파 발생장치를 이용한 세포 실험 시스템 확립
- 방사선을 이용한 대조군 연구  
방사선 조사후 인체 T 임파구 세포 성장 저하
- 1.765GHz 전자파를 이용한 세포 반응 연구  
75W/Kg 전자파 노출기간동안 세포 성장저하  
Actin polymerization 증가와 같은 스트레스 반응  
DNA 합성속도는 변화가 없거나 다소 저하됨  
염색체 이상은 발견되지 않음
- 1.5W/Kg 세포 성장이나 DNA 합성속도에 변화 없음