158

Lee E[1], Byun S[2], Kim J H[3], Yeo W[1]
1. Seoul National University Hospital, 2. Seoul National University Bundang Hospital, 3. Kangwon National University Hospital

IMAPACT OF MAGNETIC FIELDS ON THE GROWTH OF CANCER CELL LINES OF GENITOURINARY SYSTEM

Hypothesis / aims of study

Perineal magnetic stimulation for urinary incontinence was first described in 1999 by Galloway *et al* and it showed encouraged results [1]. The magnetic field penetrates in all body tissues without significant alteration, falling off only as the inverse square of the distance and passing uninterrupted through clothing. As a consequence, it is not necessary to have the patient undress for treatment.

Recent epidemiological studies on occupational and residential exposure to electric magnetic fields are concerned with the biological effects of 50-60 Hz fields, particularly with determining an increase in cancer incidence in individuals exposed to these types of radiation [2.3]. Thus magnetic field exposure may be associated with development and progression of tumor.

The aim of this study was to investigate the interaction between commonly used magnetic field (MF) exposure for urinary incontinence and growth of genitourinary cancer cell lines.

Study design, materials and methods

Two bladder and two prostate cancer cell lines were used: T24, 253J, DU-145 and LNCAP. The cells were grown in RPMI 1640 culture medium with 10% FBS and 1% penicillin/streptomycin at 37±0.5 and 5% CO_2. The cells were seeded in a concentration of 1 x 10^4 cells/ml in a 96-well plate. Each cell line was categorized into 3 groups, including control (no exposure), 10 Hz group (9 mT in magnetic field flux density) and 50 Hz group (12 mT in magnetic field flux density). The control comprised of 16 wells and the other groups 8 wells.

Magnetic exposure comprised of 5 sessions of 30 minutes each. It was done daily using a specially designed chair (Mcube Technology, Inc., Seoul, Korea). The session included 30 minutes of intermittent low frequency stimulation (3 seconds at 10 Hz and 6 seconds off) for the 10 Hz group and 30 minutes of intermittent high frequency stimulation (3 seconds at 50 Hz and 6 seconds off) for the 50 Hz group. After 5 days of exposure, the cell growth was evaluated using MTT assay. Statistical analysis was done using Mann-Whitney U test.

Results

Magnetic field exposure reduced cell growth in the 10 Hz and 50 Hz groups compared to the control group (Table 1 and 2) and it was statistically significant ($P<0.05$).

Table 1. Tumor growth kinetics (in Optical Density ± S.D.) of the 10 Hz group

	Control	10 Hz group	P value
T24	3.26±0.2	2.82±0.11	0.000
253J	3.64±0.18	3.32±0.48	0.006
DU-145	3.63±0.11	3.41±0.09	0.001
LNCAP	3.43±0.17	3.27±0.16	0.045

Table 2. Tumor growth kinetics (in Optical Density ± S.D.) of the 50 Hz group

	Control	50 Hz group	P value
T24	3.26±0.2	2.69±0.09	0.000
253J	3.64±0.18	3.33±0.17	0.001
DU-145	3.63±0.11	3.13±0.12	0.000
LNCAP	3.43±0.17	3.11±0.12	0.006

Interpretation of results

Magnetic filed exposure with usual dosage for urinary incontinence did not increase the tumor growth. This might suggest that potential tumor growth could not be expected in the patients with hidden and established genitourinary malignancies for treatment of urinary incontinence.

Concluding message

Magnetic field exposure on T24, 253J, DU-145 and LNCAP cancer cells demonstrated reduction of cell growth. Further studies are needed to investigate its mechanism of decreased growth of genitourinary cancer cell lines.

References

1. Galloway NT et al. Extracorporeal magnetic innervation therapy for stress urinary incontinence. Urology 1999;53:1108
2. Schroder JC and Savitz DA. Lymphoma and multiple myeloma mortality in relation to magnetic field exposure among electric utility workers. Am J Ind Med 1997;32:392
3. Wertheimer N and Leeper E. Electrical wiring configuration and childhood cancer. Am J Epidemiol 1979;109:273.

Funding

Mcube Technology, Inc