P23- An Investigation of the Effect of Electromagnetic Waves with Low Frequency in Causing Chromosome Damages in L929 Cell Line

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Abstract

Objective: During cellular divisions at times the segregation of chromosomes encounters difficulties in a way that in diploid cells in every hundred cell divisions one chromosome will makes a mistake. The result of these mistakes is the creation of cellular aberration which have disorders in the number of their chromosomes. More than a century ago, researchers in their investigation of cancer cells noticed that most cancers contain cells that not only posses an abnormal number of chromosomes but also differ from each other in the number of chromosomes they contain. Furthermore, these chromosomes commonly have structural aberrations that are rare in normal cells. Therefore we need to come to a better understanding of the elements which are effective in causing chromosome disorders in order to develop appropriate strategies to identify or fight against diseases such as cancer. For this purpose researchers have investigated different related elements such as mothers‟ age or aberrant recombination. One of the other frequently investigated elements is non-ionizing electromagnetic waves. This group of waves is often used in radio communication and microwave resources such as cell phones. In the present study it has been tried to investigate the effect of non-ionizing electromagnetic waves of the RF type with a wavelength equal to that of mobilephones on the abundance of micronucleus in L929 cells. **Materials and methods:** In the study the L929 cells were divided into two groups (1&2) and then were exposed to electromagnetic waves. The cells in each group were subsequently divided into three groups which were placed for two hours in one of the continuous, discontinuous and off electromagnetic fields. Before the cells in group 2 were placed in the electromagnetic field they were treated with 0.5 ng/ml of vinblastine sulfate as ananeugenic factor. Finally the cells were treated with 4µg/ml cytochalas in B and cell harvest was performed after 20 hours. After obtaining slides and staining them with giemsacolor, mononucleated cells, binucleated cells and binucleated cells with micronucleus were counted. These results were analyzed using Minitab software and one-way variance test (ANOVA) (P<0.05). **Results:** In group1 the abundance of micronuclei in the discontinuous electromagnetic field (13/35) as compared to the continuous field (8/71), off field (2/50) and control (1/91) showed a significant increase. Whereas in group 2 no significant difference was observed in the abundance of

micronuclei in the three fields of discontinuous (13/92) continuous (14/01) and off (12/23).
Conclusion: By counting Micronuclei and performing statistical analysis on them it was observed that the discontinuous field caused more damage in comparison with the continuous field. The mean of the counted micronuclei when treated with the discontinues field was very close to the mean of micronuclei yielded by continuous and discontinuous electromagnetic fields when accompanied by vinblastine. It seems that the amount of damage caused by the mixing of electromagnetic field with vinblastine has a saturation limit and doesn‟t exceed it. And that the discontinuous field is responsible for causing the maximum amount of damage to the cell, a kind of damage similar to the effect of vinblastine an eugenic factor and the electromagnetic field.

Keywords: Chromosome, Electromagnetic Waves, L929 Cells, Micronucleus Test in Double Nucleus Cells