Exploring the Effect of Electromagnetic Energy on the Growth of Carbon Based Plants

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Abstract: after the Treatment of Human Lung Fibroblasts and Apical Meristem in Vitro by Simulated Ultra-Low Frequency Electromagnetic Field, Root Growth Assay, Cell Proliferation Assay, Fluorescence Staining Analysis and Single Cell Gel Electrophoresis Analysis Were Carried out. the Biological Effects of Elf Electromagnetic Field on Cells Were Discussed. the Effects of Elf Electromagnetic Field on Cell Proliferation, Differentiation, Apoptosis and Dna Damage Were Studied. It Was Found That Electromagnetic Field with Different Field Strength Had Significant Effect on Cell Proliferation. It is Related to Temperature and Processing Time.

1. Introduction

The Reference Frequency of Extremely Low Frequency Electromagnetic Field (Elfmfs) is Below 100 Hz. the Power Frequency, High Voltage Transmission Line and Power Frequency Magnetic Field (50 ~ 60hz) Produced by Household Electrical Appliances in Daily Life Belong to This Frequency Range. Histopathological Studies Show That There is a Certain Correlation between the Occurrence of Various Human Tumor Diseases[1]. It Has Become a Hotspot in the Field of Biomagnetism At Home and Abroad. Most Reports Suggest That Low Frequency Magnetic Field is Related to Abnormal Cell Proliferation and Chromosome Abnormality. Research on Specific Animal and Plant Cells in Order to Use Specific Magnetic Field, Focus of Cell Biological Effect of Force Frequency Magnetic Field, Angle of Cell Biology and Molecular Biology, Preliminary Research on Biological Effect of Extremely Low Frequency Electromagnetic Field and Organic Production, Prevention of Radiation Diseases of Electromagnetic Radiation and Theory of Better Reduction in the Future, for Practical Use the Importance of.

2. Materials and Methods

2.1 Generating Device of Electromagnetic Energy

Using a self-made cylindrical solenoid with a diameter of 15 cm and a height of 23 cm, the AC voltage of different bolts is applied at both ends at different frequencies to produce a magnetic field of different strength[2]. The subjects were placed on the solenoid for a certain period of time. The adjustable position makes the magnetic field of the test unit uniform and controls the temperature in the solenoid to ensure the normal growth of cells and tissues.

2.2 Growth of Onion Root Tip

The roots of onion were exposed to 20 ° C and 30 ° C respectively, 4mt ELF electromagnetic field. The growth of roots was observed within 5 days. The mitotic index was measured by optical microscope and compared with the control group[3]. The effects of different treatment time and temperature on the growth and growth of onion root tip were observed under the same magnetic field intensity.

2.3 Proliferation and Apoptosis of Pulmonary Fibroblasts

Human lung fibroblasts (Hu lung fibroblasts, Chinese Academy of Sciences, Chinese Academy

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of Sciences) were irradiated with very low frequency magnetic field at different time (12 h, 2 D, 3 D, 4 D, 6 d), 4 M T, and cultivated human lung ELF electromagnetic field. The effect of fibroblasts on the setting of CO 2 incubator (37 ℃, 5%).

After passing through the cells at a certain concentration and after 72 hours (normal growth period) of magnetic field treatment, the cell number and death statistics were carried out by the trialcohol blue pigment exclusion test, the growth state was observed and compared with the magnetic field irradiation group and the control group.

The cell suspension was extracted and the appropriate fluorescent pigment acrylic orange was stained. Apoptosis was observed under fluorescence microscope.

Cell suspension was collected and analyzed. Single strand DNA damage was analyzed by single cell gel electrophoresis with 12h T, 2D, 4D, 6D and other 4m T magnetic fields.

3. Result

3.1 Effect of Electromagnetic Energy on the Growth of Onion Root Tip

At the same temperature (20 ° C or 30 ° C), the cell division and proliferation of onion root border cells were significantly promoted[4]. The division index of root end cells in the control group and the control group under light microscope were investigated. At 20 ° C, 24 hours, 48 hours, 72 hours, the mitotic index of onion chips treated with magnetic field at 50 Hz, 4 m t was much higher than that of the control group at the same temperature. In the statistical analysis, P < 05 represents the effective difference (Table 1).

At the same magnetic field (450 Hz, MT) and different temperatures (20 ° C and 30 ° C), the ability of cell division is different. The growth rate of onion roots in 30 ° C group was slower than that in 20 ° C group. Similarly, in the 30 ° C group, compared with the control area, the root growth is later at 20 ° C, whether the onion root growth rate is 30 ° C under magnetic field irradiation, later, and the mitotic index is low (Table 2)[5]. In addition, at 30 ° C of 4 M T magnetic field, the root of onion root, bent and yellowed, making the root disappear and the root granules disappear, but the same temperature management group is slowly proliferating, but the irradiation group is at 20 ° C ~ 4 MT, the growth of onion root shows dense, fine, smooth, white color, no bending. The onion roots in the control group were less than those in the irradiation group. 2. The effect of magnetic field irradiation on the growth of two human pulmonary fibroblasts on the irradiation of human pulmonary fibroblasts with 50 Hz, 4 mT magnetic field for 72 hours, staining trichromatic pigment, cell number and death statistics were repeated for three times. The average cell number of the control group was (10.075 ± 3.56) × 105, and the average mortality was 2. 54 +. Set to 2)% and the average number of units in the magnetic field irradiation group is 2. 931 ± 0.28) × 105, the average mortality was 5. Compared with the control group, 03 ± 0.01% showed significant difference.

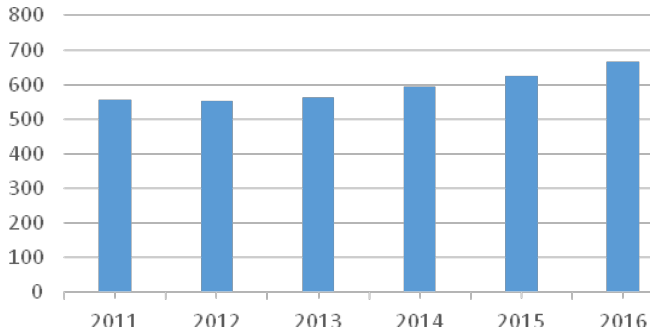

Fig.1 Radiation Status in 2011-2016

The cultured cells were stained with acrylic orange and apoptosis was observed under fluorescence microscope. In the magnetic field irradiated group, the human lung fibroblasts showed nuclei and crescent like staining close to the cell membrane. At high concentration, apoptotic body was formed. There was no obvious abnormality in the control group[6]. In a single cell gel

electrophoresis experiment, 20 x 10 times fluorescence microscope was used for random observation. According to the tail length of the comet cells, 100 cells were graded. Level 0: injury or injury rate is less than 5%, grade I: mild injury or injury rate 5% to 10%, rank: slander or injury rate 20% to 39%; grade III: serious injury, or injury rate 40% to 94%, grade IV: total injury, injury rate is more than 95%; V: cell alkaline single cell gel electrophoresis analysis shows that 12h, 2D, 4D, 6D magnetic field treatment of cell electrophoresis after different cell adhesion phenomenon. There are different DNA single strand damage. For the statistical and control groups, the analysis method of level 5 is used to compare with this row. From table 3, it can be seen that the proportion of damaged units will increase and the degree of damage will increase when the exposure time is long. Magnetic field can increase the apoptosis of human lung fibroblasts.

4. Discussion

In recent years, with the rapid development of science and technology, the edge law of electromagnetic biology has been expanding and deepening. The influence of electromagnetic radiation on the growth, development, differentiation and heredity of biology has become a hot topic[7]. However, due to the strength and time of the magnetic field, the existence of many uncertain factors, such as the theme, researchers in various countries failed to reach a consensus in independent research activities. Through this experiment, we explore the phenomenon that magnetic field affects the proliferation of animal and plant cells. Finally, this may help to reveal the nature of biological magnetic field.

In this experiment, we first discussed the effect of specific intensity of ELF electromagnetic field on the proliferation and proliferation of animal and plant cells at different temperatures and times. Under the same temperature, the cell division and proliferation of onion root chips were significantly promoted by 72 Hz 50 Hz and 4 mT magnetic field irradiation. Under the same magnetic field treatment, onion roots grow slowly (except) at 20 ℃, which is the effect of temperature; under the 30 ° C magnetic field treatment, the shape of root appears the change of chromosome, the abnormal shape of root and chromosome are not recognized, and the shape of root group changes under the 30 ° C magnetic field treatment. No chromosome abnormality was found. When the magnetic field and temperature reach a certain range, the cell chromosome will appear abnormal. The superposition of magnetic field and temperature will lead to the abnormal proliferation of onion root. Therefore, in the study of cell biological effects of electromagnetic field, the effects of electromagnetic field and thermal interference should be considered[8]. 4mt magnetic field has an important inhibitory effect on the proliferation of human lung fibroblast cells. Based on the above results, the phenomenon and mechanism of the biological effect of magnetic field were preliminarily investigated.

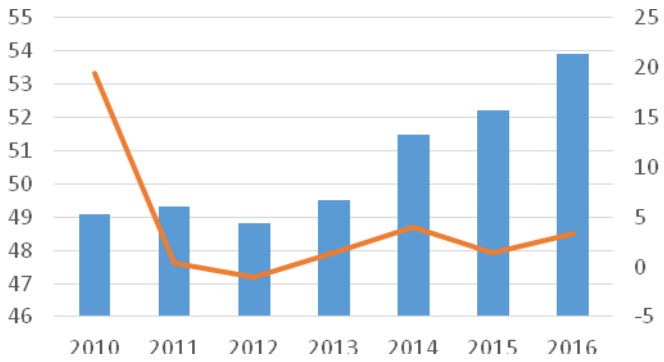

Fig.2 Trend Chart of Radiation

The thermal and non thermal effects of plant cell proliferation on electromagnetic energy, the stimulation and growth of plant root and embryo axis by magnetic field irradiation, increase cell division index, promote seed germination, root activation, root activity, and improve the important report of plant to the body. The synthesis of materials provides more intermediate products. Tomato

seeds were treated with different intensity of magnetic field, and the appropriate intensity of magnetic field increased the germination rate and enzyme activity. In this experiment, onion roots are exposed to magnetic fields at different temperatures. The proliferation rate of the treatment group was compared with that of the control group at the same temperature of 72 Hz, 50 Hz, 4 mT magnetic field irradiation to promote the cell division and proliferation of onion root end cells. The growth rate of onion root in 30 ° C magnetic field is slower than that in 20 ° C magnetic field. Similarly, 20 ° C in the 30 ° C control group was slower than that in the control group. Temperature itself is an important factor affecting cell proliferation. It can be seen that temperature and magnetic field irradiation are not enough to cause the change of growth direction of root tip and the change of cell chromosome[9]. If the magnetic field and temperature reach a certain degree, the cell chromosome will be abnormal. Then, root growth and bending take place. However, in the previous report, the temperature effect of ELF magnetic field irradiation is not enough. We aim at magnetic fields. In order to control the temperature of the experimental system, the thermal effect is studied.

In the range of 2 × t ~ 8m magnetic field, the effect of magnetic field intensity on Germination and growth of Wenwen seed was investigated. The growth of bean sprouts was promoted by 4 mT magnetic field, and the seeds of Wenwen were promoted by 6 MT and 8 mT magnetic field. Germination. Whether the increase of chromosome DNA synthesis in init / 10t / 2 cells exposed to 60 Hz, 0.1 ~ 0.8 mT magnetic field is affected by the effect of magnetic field or thermal effect was studied. The results showed that the increase of DNA synthesis in experimental group and control group increased the ambient temperature. Therefore, a little increase of temperature around several cells is very sensitive, so they are the mechanism of biological effect of magnetic field. Therefore, we should be very careful. The experiment strictly controls the heat produced by electromagnetic field, and correctly judges and explains the influence of non thermal effect of electromagnetic field on life effect.

The intensity of magnetic field has different effects on different biological forms. At present, most of the single cells cultured in the experiment have influence on the organism, but the single cells cultured in the organism depend on the overall regulation mechanism of the organism. In an ideal environment, the response to the external environment is different from that of all organisms. Different types of cells respond differently to magnetic field radiation. This may be one of the important reasons for various reports at home and abroad. Our experimental results show that 4 hours and 72 hours of ultra-low frequency magnetic field irradiation can promote the division of onion root tip cells, but also hinder the proliferation of human lung fibroblasts, with different degrees of single strand DNA damage. The apical cells were treated in vitro, and the fibroblasts were cultured in vitro, so the conclusion under the same magnetic field intensity was not the same. The effect of electromagnetic field on each cell is different from that of tissue and organism. In addition, the effects of ELF magnetic field on plant cells and animal cells are different. In many previous studies on the biological effects of low-frequency magnetic fields at home and abroad, the model is a single cell, and the results are consistent laboratory rather than imperfect reproducibility, which makes the results unacceptable.

5. Conclusion

The experimental results show that although the biological effect of low-frequency electromagnetic field exists objectively, it has a complex relationship with the type, intensity, time and temperature of the subjects. At present, the mechanism of low-frequency electromagnetic field has been reported at home and abroad, but it is not clear. Different methods and means are needed for deep and fine work.

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