Brigham Young University

Microbiology Department

March 31, 1977

Mr. John E. Marsh
1244 Emerson #204
Denver, Colorado 80218

Dear John:

Enclosed is the report on my research with Electro-magnetic force field.

Under the conditions of these experiments, I was unable to see any significant effects of this form of radiation on the paramenters we studied.

After you go over these data, you might give me some suggestions on what might be done to get positive results.

We still have enough funds to conduct one or two more experiments.

I hope your Mexico project works out--I would be happy to help you if I could make a positive contribution.

Best regards,

Marc

MMJ:lm

Enclosure

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PROJECT REPORT

The following report contains the results of experiments conducted under the direction of Dr. Marcus M. Jensen, Department of Microbiology, Brigham Young University for JLM Distributors, Denver, Colorado. All support for this project was provided by JLM Distributors through a contract with Brigham Young University.

The title of this project was, "The Influence of Electro-magnetic Force Field Energy on Neoplastic Cells". The abbreviation EMFF will be used throughout this report for Electro-magnetic force fields. All EMFF used in these experiments were generated by a transmitter supplied by Mr. John E. Marsh. In the experiments with bacteria, the cells were placed about 6 inches from the center of the transmitter tube. In the experiments with mice this distance was about 12 inches. Further description of this transmitter will not be given in this report.

This report does not imply or constitute an endorsement by Brigham Young University of any products studied in this project.

These experiments were carried out between May 1976 and March 1977.

Experiment I

THE EFFECTS OF ELECTRO-MAGNETIC FORCE FIELDS ON BACTERIA IN BROTH CULTURES

Materials and Methods:

This experiment followed the procedure described years ago by Dr. Rife in which he observed devitalization (loss of motility) in bacteria subjected to electro-magnetic force fields (EMFF) at frequencies of 120 cycles per second.

The first phase of this experiment exposed both cultures of the bacteria Clostridium tetani and Salmonella typhi to sequential 5 minute periods of EMFF at each of the frequencies shown on table 1. After each 5 minute exposure period, a sample of bacteria was removed from the container being exposed and was observed under a phase contrast microscope. The motility of the bacteria was observed. Identical samples of bacteria that had not been exposed to EMFF were used as controls.

In the phase of the experiment with Salmonella typhi, the bacteria were cultured after being exposed to EMFF to determine if they had lost the ability to multiply.

Results:

Motility (+) or Lack of Motility (-) in:

Frequency in CPS	Clostridia tetani		Salmonella typhi	
	EMFF	controls	treated	controls
120	+	+	+	+
728	+	+	+	+
784	+	+	+	+
803	+	+	+	+
880	+	+	+	+
1552	+	+	+	+
1862	+	+	+	+
2008	+	+	+	+
2128	+	+	+	+
3505	+	+	+	+
6000	+	+	+	+
9000	+	+	+	+
11,000	+	+	+	+
15,000	+	+	+	+
30,000	+	+	+	+
60,000	+	+	+	+
98,000	+	+	+	+

No devitalization was seen in any of the EMFF treated on control bacteria samples.

No effect on the multiplication of the Salmonella bacteria was seen due to EMFF treatment.

Experiment 2

THE EFFECTS OF EMFF ON THE FORMATION OF GRANULOMA TISSUE IN MICE

The formation of granuloma tissue (scar tissue) is one of the important defense mechanisms of animals against microorganisms and cancer. The purpose of this experiment was to determine if exposure to EMFF at different frequencies influenced the rate of formation of granulation tissue.

Materials and Methods:

Adult (12 to 15 week old) Swiss mice were used in this experiment.

A #4 round cotton dental pellet was surgically implanted subcutaneously in each mouse. This served as a framework around which the scar tissue would form.

The following three groups of 20 mice each were used:

Group A: These mice were exposed to 5 minutes of each of the following EMFF frequencies each day (a total of 40 minutes exposure each day); 728, 784, 803, 880, 1552, 1862, 2008, and 2128.

Group B: These mice were exposed for 60 minutes each day to the EMFF frequency of 2128.

Group C: Control mice that received no EMFF exposure.

The granulomas were removed and weighed after 14 days.

Results:

Group A: The average weight of the granulomas was 49 milligrams (mg) with a standard deviation of 15 mg.

Group B: The average weight was 42 mg with a standard deviation of 10 mg.

Group C: The average weight was 42 mg with a standard deviation of 12 mg.

The difference in weight of the granulomas from Group A was not statistically different from the other two groups.

Experiment 3

THE EFFECTS OF EMFF ON THE FORMATION OF ANTIBODIES IN MICE

Materials and Methods:

Adult Swiss mice were used in this experiment.

Each mouse was injected intraperitoneally with 0.2 ml of somatic antigen (vaccine) from Pasteurella multocida bacteria.

The mice were divided into the following three groups of ten mice each:

Group A: Mice exposed to the EMFF frequency of 2128 for 5 minutes each day.

Group B: Mice exposed to 5 minutes of each of the following EMFF frequencies each day (a total of 40 min); 728, 784, 803, 880, 1552, 1862, 2008, and 2128.

Group C: Control mice that received no EMFF exposure.

Blood was collected from all mice 2 weeks after being injected with the antigen. The level of antibodies in the blood serum against the antigen was measured by an agglutination test.

Results:

The average levels of antibodies (measured as the reciprocal of the titer) for the three groups were: Group A= 1365, Group B= 1060, and Group C= 995.

The EMFF treated mice in group A produced a slightly higher level of antibodies.

The

Experiment 4

THE EFFECTS OF EMFF ON THE SUSCEPTIBILITY OF MICE TO PASTEURELLA MULTOCIDA INFECTIONS

Materials and Methods:

Adult Swiss mice were used in this experiment.

Each mouse was inoculated intraperitoneally with about 10 to 50 cells of the bacterium Pasteurella multocida and the death rates were recorded.

The mice were divided into the following two groups of 16 mice each:

Group A: Mice exposed to 5 minutes of each of the following EMFF frequencies each day (this experiment lasted only 2 days).

Group B: Control mice that received no EMFF exposure.

Results:

This bacterium causes a severe infection with most death occurring within the first 2 days. By 40 hours after receiving the bacterial inoculum, 11 of 16 of the EMFF exposed mice were dead and 10 of 16 of the control mice were dead. No further death occurred.

Experiment 5

THE EFFECTS OF EMFF ON THE DEVELOPMENT OF EHRLICH ASCITES TUMORS IN MICE

Materials and Methods:

The Ehrlich ascites tumor cells used in this experiment grow very rapidly in mice. When injected into the peritoneal cavity they divide like bacteria forming massive numbers of single cancer cells.

Swiss mice were used in this experiment and each was inoculated intraperitoneally with about 100,000 cancer cells.

The mice were divided into the following three groups of 24 mice each:

Group A. Mice exposed for 5 minutes per day to EMFF at a frequency of 2128.

Group B. Mice exposed to 5 minutes of each of the following EMFF frequencies each day; 728, 784, 803, 880, 1552, 1862, 2008, and 2128 (a total of 40 minutes exposure each day).

Group C. Control mice that received no EMFF exposure.

Daily exposure to EMFF was carried out for 21 days after the mice were injected with the cancer cells. The total weight of each mouse was determined every 3 to 3 days. The time of death of each mouse was also recorded.

Results:

Accumulative Death Rates on Days after mice were Injected with Cancer Cells

Group	12	14	16	18	20	22	23	24	25	26	28	30	Days
A	1	3	5	6	7	14	20	20	21	21	23	24	
B	0	1	3	3	4	13	17	19	22	22	24	24	
C	0	3	4	6	9	15	19	19	20	21	23	24	

Average weights of mice in grams on Days After Injected with Cancer Cells

	7 days	10 days	12 days	14 days
A	27.8	29.5	33.5	36.6
B	26.0	29.0	32.0	33.7
C	28.3	31.5	33.9	36.8

No significant differences were seen in the death rates or weight gains between the 3 groups of mice in this experiment.

Experiment 6

THE EFFECTS OF EMFF ON THE GROWTH OF SOLID TUMORS IN MICE

Materials and Methods:

All mice used in this study were females of the C_3H-F/st strain (obtained from Charles River, Inc.) and were 12 weeks old when injected with the tumor cells.

The tumors used had been induced by the chemical benzpyrene in cortisone suppressed mice and passed in the C_3H-F/st strain of mice for several years. The tumors used in this study had been growing for 28 days. Tumors were removed from 3 mice and cut into small pieces and then treated with trypsin to disperse the cells. The trypsin was removed and the cells were suspended in a balanced salt solution at a concentration of about 2.2×10^6 cell per ml.

Each mouse was inoculated subcutaneously, on the back, with about 4.4×10^5 cells.

The mice were divided into the following four groups of 24 mice each:

Group A. Mice exposed each day to 5 minutes of EMFF irradiation at each of the following frequencies; 728, 784, 803, 880, 1552, 1862, 2008, and 2128. Total exposure time each day was 40 minutes.

Group B. Mice exposed each day to 5 minutes of EMFF irradiation at each of the following frequencies; 2008, and 2128. Total exposure time each day was 10 minutes.

Group C. Mice were not exposed to EMFF irradiation until one week after they had been inoculated with the tumor cells. After the first week, they received daily 5 minute exposures to frequencies of 2008 and 2128. Total daily exposure time was 10 minutes.

Group D. Control mice that received no EMFF exposure.

At 24 days after injection with the tumor cells, all mice were sacrificed and the tumors were removed and weighed.

Results:

The weights of the tumors are shown in the following table.

Weights of Tumors in Milligrams in:

Group A	Group B	Group C	Group D
43	5	154	130
270	13	157	259
221	100	190	334
228	135	252	337
341	220	263	435
356	313	302	440
374	330	390	502
453	380	416	510
458	475	435	537
502	535	479	538
507	649	480	557
510	624	551	605
532	672	580	661
534	651	581	674
544	774	589	689
558	731	590	702
600	848	600	737
609	942	630	739
619	1093	702	762
643	1135	810	763
754	1108	832	853
857	1206	1006	932
873	1249	1043	1026
1003	1256	1503	1416
Mean 517	644	564	631
Std. Dev. ±221	±403	±315	±270

The variations in weights of tumors between the four groups were not significantly different on statistical analysis.