



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Eyobed T. Mesfun	Project Number S1725
Project Title The Study of the Effects of Electromagnetic Fields at Various Frequencies upon Cancerous and Noncancerous Cells	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to see what effects various frequencies of Electromagnetic fields had on the reproductive growth of cancerous and noncancerous cells.</p> <p>Methods/Materials</p> <ol style="list-style-type: none">1. Culture the cell lines CCL-107, CCL-219, and CRL-2535 according to ATCC procedures.2. Construct nine electromagnetic field emitting boxes.3. Take your petri dishes place 5 mL of the growth medium with the cells you want to test in each petri dish. Para film the edges to insure no leaks. Place 4 petri dishes in each of the electromagnetic field boxes and 4 controls in the incubator (do this separately for each cell line).4. After 48 hours remove the petri dishes from the aluminum boxes in the incubator, take a 500 microliter sample from each petri dish, place those samples individually in different capsules with a 1:1 volume of Trypan blue staining dye.5. Then pipette 10 microliters and place it in the groves of a hemocytometer and place a glass slide over it and count the number of cells in each of the four 1 square mm corners and divide to get the average.6. Then multiple by 10 to the 5th power to get the approximate cells in the 5 mL petri dish.7. Lastly Run a one way ANOVA test and analyze your data. <p>Results</p> <p># The data I collected regarding electromagnetic field exposure upon Glioblastoma Multiforme (GBM) suggests:</p> <ol style="list-style-type: none">1. The P-value, which is 1.06E-16, provides the evidence to reject the null hypothesis which states that EMFs do not affect the growth of GBM. <p># The data I collected regarding electromagnetic field exposure upon Leukemia suggests:</p> <ol style="list-style-type: none">1. The P-value, which is .397, leads to the acceptance of the null hypothesis which states that EMFs do not affect the growth of Leukemia. <p># The data I collected regarding electromagnetic field exposure upon healthy glial cells suggests:</p> <ol style="list-style-type: none">1. The P-value, which is .015, provides the evidence to reject the null hypothesis which states that EMFs affect healthy glial cells in a harmful manner. <p>Conclusions/Discussion</p> <p>Through all the information obtained throughout the course of this experiment I have proven half of my first hypothesis to be correct. GBM when exposed to the various EMF frequencies decreased in cellular reproduction on average by 48.03% amongst all the trials, with P-values supporting these results.</p>	
Summary Statement Low intensity high frequency electromagnetic fields have the ability to disrupt the cellular reproduction of cancer cells.	
Help Received Howell Ivy helped me construct my EMF emitting boxes. Valley Christian provided the lab equipment.	