



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Arthur Kuan</b>   | <b>Project Number</b><br><b>S0408</b> |
| <b>Project Title</b><br><b>Antioxidant Enzyme Activities of Drosophila melanogaster under the Exposure of WiFi 2.4 GHz Electromagnetic Field</b>   |                                       |
| <b>Abstract</b><br><b>Objectives/Goals</b><br>Whether 2.4GHz Electromagnetic Field (EMF) will have an impact on Drosophila melanogaster's antioxidant enzymes.<br><b>Methods/Materials</b><br>1. Collect 3000 randomly selected Drosophila (of the same age) and feed them dry yeast [dry yeast expands the female fruit flies# ovary capacity for more eggs] 24 hours before experiment.<br>1.Remove the juice plate with eggs on it and replace it with a new juice plate and start the timer for two hours (to synchronize the eggs).<br>2.Remove the juice plate with eggs on it after two hours (the newly collected one) and place it on the EMF stage in the Wave-Pro Chamber; turn the EMF signal on through the computer for 16 hours.<br>1.Collect samples at 4hour, 8hour, and 16hour mark respectively.<br>2.Store samples at -80 degree refrigerator for later antioxidant activities# tests.<br>3. Repeat above steps for the control group (sham exposure)<br>Drosophila adults collection<br>For the Adults, select 90 fruit flies (not sorted by sex) and put them in a vial with a cotton over it for air. Repeat steps until there are eight sets of vials 4, 8, 16 hours# EMF and control groups respectively.<br>1. tape the vials onto a board and tape that onto the EMF antenna for exposure.<br>2. Take out vials that have been exposed the amount of exposure needed.<br>3. Place 30 fruit flies in one eppendorf to homogenize.<br>Enzyme activities protocol not included on this abstract due to space.<br><b>Results</b><br>Embryo - decreased SOD, GPx levels, increased CAT levels, and GR has no significant difference.<br>Adult - decreased SOD levels, and increased CAT, GPx. GR has no significant changes<br><b>Conclusions/Discussion</b><br>Drosophila#s embryonic stages exhibit protections against oxidative stress from EMF radiation via decreased SOD and GPx as the primary barrier (depleted); and induced CAT level for the secondary barrier . GR has no significant influence by the oxidative stress resulting from EMF radiation in my studies. However, at the adult stage, only SOD is depleted at the primary defense; CAT and GPx are both induced for the secondary defense system. GR also has no significant changes in our studies. I suggest that the adult stage is not as sensitive as the embryonic stage in Drosophila melanogaster ,and therefore the antioxidant#SOD serves as a barrier to protect the body by evidence of depletion. |                                       |
| <b>Summary Statement</b><br>My project is aimed to investigate the impact of Electromagnetic Field's radiation on Fruit Flie's antioxidant enzymes.  |                                       |
| <b>Help Received</b><br>Used lab equipment at Chang-Gung University, Tao Yuan, Taiwan under the supervision of Dr. Chang Cheng-Nung  |                                       |