



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Andrew B. Nazareth	Project Number 34370
Project Title Radiation: How Safe Are You with Your Daily Devices?	
Objectives/Goals My project compares electromagnetic radiation levels emitted from our daily devices at multiple measured distances and times, investigates which device exceeds the federal safety limit of .001mW/cm ² to 1mW/cm ² for the various devices, assesses the effect of aluminum foil as an effective radiation absorber, and determines a safe distance to use these devices to avoid the harmful effects of radiation. Abstract My project compares electromagnetic radiation levels emitted from our daily devices at multiple measured distances and times, investigates which device exceeds the federal safety limit of .001mW/cm ² to 1mW/cm ² for the various devices, assesses the effect of aluminum foil as an effective radiation absorber, and determines a safe distance to use these devices to avoid the harmful effects of radiation. Methods/Materials 44 trials were conducted with each trial from 3-7 times and at 4-7 distances to measure the electromagnetic radiation level with a 8 GHz Basic RF Meter, emitted from the cell phone tower, microwave oven, cell phone, smart meter and AT&T U-Verse modem. The readings were then compared to the current FCC/FDA safety limits for each device. For 9 trials, the radiation levels from the cell phone tower, AT&T U-verse modem and microwave oven were measured using aluminum foil to investigate if aluminum could absorb and reduce radiation levels emitted from these devices. Results The cell phone tower readings ranged from 3.9 mW/m ² at 25 m to 0.2 mW/m ² at 125 m. The smart meter readings ranged from 3.1 mW/m ² at 1 m to 0.005 mW/m ² at 10 m. The cell phone readings ranged from 5.1 mW/m ² at 5 mm to 0.01 mW/m ² at 15 mm. The microwave oven readings ranged from 1827 mW/m ² at 2 in to 48 mW/m ² at 18 in. The AT&T U-Verse modem readings ranged from 317 mW/m ² at 5 in to 12 mW/m ² at 15 in. With measuring 3 devices with aluminum foil, the microwave oven readings dropped by 90% to 182 mW/m ² (total average) at 2 in. The AT&T U-Verse readings dropped by 44% to 179 mW/m ² (total average) at 5 in. The cell phone tower readings dropped by 45% to 2.14 mW/m ² (total average) at 25 m. Conclusions/Discussion All the measured devices showed decreases in EMF wave field strength, with increased distance from the devices. All devices (except possibly for the microwave oven at 2 inches) did not exceed the FCC/FDA limit for uncontrolled exposure. The microwave oven and AT&T U-Verse readings were comparatively higher than the cell phone tower, cell phone and smart meter readings. People should be aware that there is a bigger risk of radiation exposure especially to children, when using microwave ovens, AT&T U-Verse modems and other wifi devices than from cell phone towers, smart meters and cell phones. The FCC/FDA should consider a separate safety limit for children. Aluminum foil is an effective absorber of radiation.	
Summary Statement My project compares radiation levels emitted from our daily devices at various times and distances and determines if they are within the FCC/FDA safety limit of .001mW/cm ² to 1mW/cm ² for the various devices.	
Help Received Dr. Youssef Ismail helped me understand the concepts related to EMF emission from wireless devices and guided me through the various stages of the experiment.	