



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Elyse M. DeWitt	Project Number J1406
Project Title Body Electric: The Effect of Electromagnetic Fields on Human Bone Piezo	
Abstract Objectives/Goals The objective of this project is to demonstrate that human bone is a piezo material and determine the affect of electromagnetic fields on the piezoelectricity of human bone. Methods/Materials Electromagnetic field emitter and transmitters, such as various household appliances, electrical power lines, electrical substations and a digital cell phone will be tested for their affect on a human bone piezo. Various household appliances, while running, are exposed to a human bone piezo device mounted on a foil backed board to prevent contamination of signal. Leads of the human bone piezo device are attached to the 10:1 probe of an oscilloscope set a 5mV sensitivity. The appliance, or EMF source, is moved away incrementally with an oscilloscope reading taken each increment. Each experiment has five trials to ensure accuracy. Results The human bone piezo device responded to electromagnetic field exposure by creating an electric current in the range of 5mV. Conclusions/Discussion Results confirmed the hypothesis that exposure to an electromagnetic field will affect the mV output of human bone piezo. The conduction of electrons is proof that a non-thermal event(such as deformation) has taken place inside human bone. This work could help create a new standard for electromagnetic exposure, since the current standard, SAR(specific absorption rate), deals only with the thermal effect(massive EMF doses).	
Summary Statement The effect of electromagnetic fields on human bone piezo.	
Help Received Dad helped cut human bone, solder electronic parts; Mom imported graphs to Word; Dr. Andrew Marino gave instructions on how to cut wafers from human femur to maximize piezo effect.	