



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Kamran Ansari	Project Number J1902
Project Title Characterizing the Dosage Profiles of PEMF Products by Evaluating Their Magnetic Field Distributions	
<p style="text-align: center;">Abstract</p> <p>Objectives The project objective was to measure the magnetic field dose profile of various PEMF devices and generate dosing maps that consumers could then use to position their bodies in order to receive a desired magnetic field dose.</p> <p>Methods OMI Pulsepad PEMF, OMI Full Body PEMF System, HL Healthyline Infrared PEMF, Oska Wellness Pulse device, Adafruit LSM9DS1 Magnetometer 9 Degrees of Freedom Breakout, Arduino Board, Excel, Wood Router, MotionCal program, EXTECH Instruments magnetometer</p> <p>I divided the surface areas of four different PEMF devices into a grid. I created my own magnetometer using an Arduino board with an Adafruit LSM9DS1 Magnetometer 9DOF, which can detect microTesla level changes in a 5 to 25 Hz frequency range. I programmed the board to acquire magnet field flux data using code I wrote in Arduino. I used MotionCal software to calibrate data in the X, Y, and Z directions as I moved the magnetometer over the grid. At each grid point, I collected over 1000 points of data over 10 second sample period, imported the data into Excel and calculated the magnetic field flux values. I automated the process by creating a dolly that automatically moved and collected data from each grid points because of the large number of grid points that needed to be measured.</p> <p>Results 3-D surface and contour maps of root mean square values show that the OMI Small generates an effective magnetic field dose across about 13% of its surface area and only partially in the upper left, lower left, and upper right quadrants, the other 87% of the device has a magnetic field of 20 microTesla or less (non-therapeutic levels). OMI large generates a sufficient magnetic field across about 36% of its surface area, largely in the center. HL Mat generates a therapeutically effective dose across about 55% of its surface area. The Oska device generates a uniform magnetic field across over 60% of its surface area.</p> <p>Conclusions Magnetic field strength, and therefore potentially the therapeutic dose, of PEMF devices vary greatly over their surface areas, a critical fact that manufacturers have failed to disclose to the public. Therefore, to effectively use a PEMF device, it is essential to know the distribution of its magnetic field strength and to adjust one's body position to properly align with the desired magnetic field dose, which my results have documented.</p>	
Summary Statement My project provides patients with data that is essential for the effective use of PEMF devices but not currently provided by their manufacturers: the magnetic field dose profile generated across the surface of each PEMF device.	
Help Received My Dad helped me with cutting the wood for the dolly and my teacher provided me guidance. The rest of the project I worked on independently.	