



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jeff M. Sotelo</b>	<b>Project Number</b> <b>S0816</b>
<b>Project Title</b> <b>Can a Pacemaker Get Recharged to Reduce Pacemaking's Invasiveness?</b>	
<b>Objectives/Goals</b> -Plan out an efficient system that can charge scaled up version of a pacemaker. -Design a pair of electrodes that can transmit electricity through an electrically resisting tissue substitute. Then attach to charging system. -Test the system's efficiency at charging a battery through a simulated tissue medium and then power the pacemaker with it. -Test the safety of the prototype by testing how much ambient electricity is surrounding the medium by measuring voltages of the contiguous gelatin.	
<b>Abstract</b> <b>Methods/Materials</b> <b>MATERIALS:</b> Experimental Supplies: Pacemaker parts (refer to the log book#s total list of the parts); -Power Supply (9V); Rechargeable 9 volt battery; Hookup wire. Soldering supplies: Desoldering Braid (to make leads out of and desolder mistakes); Soldering iron; Solder. Testing Supplies: Multimeter (to measure various electrical units during the experiment); Gelatin (human tissue substitute); Mold or Tupperware Case (to place gelatin in); Thermometer.  <b>METHODS:</b> Solder pacemaker components onto a circuit board (mine was supplied by pacemaker project). Then attach a rechargeable battery to the test pacemaker. Design and test various electrode prototypes to charge pacemaker with. Test the systems efficacy by charging the system through the gelatin and running it. Collect data from the charging and discharging cycles by using the multimeter. Test the prototype's safety by testing how much excess voltage is being passed.	
<b>Results</b> The results were that there was a linear voltage/distance relationship for the first trial (trend=-0.8v/14cm). There was also a predictable relationship of resistance for every centimeter of thickness and distance from electrodes. Thirdly the efficacy of the charging process proved to be very confusing because of a trend that revealed that efficiency decreased as the gelatin's thickness was decreased.	
<b>Conclusions/Discussion</b> First of all, charging anywhere between 0.2-0.5 cm is completely feasible if the charging current is 9 volts or below, and that the surface area of the electrodes needs to be greater than 2 square inches total (mk II	
<b>Summary Statement</b> The project is aimed at finding a suitable power charging system that can eliminate the need to surgically replace a pacemaker.	
<b>Help Received</b> Edna Sotelo (mom) drove around and bought parts; Pacemaker Project supplied the original blank circuit board; Mrs De La Cruz supplied the room to conduct experiments at.	