



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

<b>Name(s)</b> <b>Lelah M. Ericson</b>	<b>Project Number</b>  31598
<b>Project Title</b> <b>The Human Battery: Reducing the Human Body's Resistance to the Flow of Current</b>	
<b>Objectives/Goals</b> <b>Abstract</b> With the development of cell phones and other small devices that we carry with us has come the problem of keeping their batteries charged. It would be wonderful if people could use energy produced by their body as a back-up power source for their electronic devices. A "human battery" works by using the human body to complete a circuit so that electricity flows. The resistance of the human body to the flow of electricity controls the strength of the current. How can the human battery be enhanced to produce a stronger electrical current? My question is "Which liquid (water or vinegar) minimizes the human body's resistance to the flow of current?" My research showed that acid is used in batteries to provide the electron transfer necessary to generate electricity. My hypothesis is that water will reduce the human body's resistance to the flow of current but since vinegar is acidic it will furthest reduce the human body's resistance. <b>Methods/Materials</b> To build the human battery I connected wires to copper and aluminum plates and to the terminals of a micro-amp (ua) meter. I measured the electrical current produced by 48 different people using each of three treatments (no liquid, water, vinegar.) Each person placed their hands on the two metal plates and I recorded the current produced. Then I sprayed water on the person's hands, placed their hands on the plates and measured the current produced. I dried their hands, sprayed vinegar on them, placed them on the plates and again measured the current produced. <b>Results</b> The average current produced by dry hands was 25.64 ua. For hands wet with water it was 58.65 ua. For hands wet with vinegar it was 82.29 ua. The results show that the strongest current is produced when hands are wet with vinegar. <b>Conclusions/Discussion</b> My hypothesis was correct. Both vinegar and water appear to be reducing the human body's resistance to the flow of current. The use of vinegar produces the strongest current. It is possible that the vinegar is acting like an electrolyte solution in a cell battery and creating a higher electron transfer rate. During my experiment I encountered several problems. The first time I did this experiment, using a micro-amp meter with a range of 0 to 50 ua, the data in many cases topped out at 50 ua. I redid my experiment using a ua meter with a range of 0 to 500 ua. This allowed me to see what the highest readings actually were.	
<b>Summary Statement</b> This project is about an electrical circuit that is completed by the human body and testing whether water or vinegar will minimize the resistance of the human body to the flow of current.	
<b>Help Received</b> My grandfather helped me to build the human battery. My mom and the students in her classes helped me by allowing me to conduct my experiment using them as subjects.	