



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Meenakshi T. Mukherjee</b>	<b>Project Number</b> <b>J0524</b>
<b>Project Title</b> <b>The Effect of Curcumin on Metal Ions</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Curcumin found in the common curry spice, turmeric, is thought to help in Alzheimer's Disease (AD). Plaques are formed in the brain that causes AD. Curcumin may reduce these plaques by directly removing them, or by reducing their formation. To form these plaques metal ions are needed. Curcumin may remove these metal ions so it reduces plaque formation. My question was to investigate what effect curcumin has on different metal ions. HYPOTHESIS: New curcumin-metal ion complexes will form and I will be able to isolate them. All four (copper, zinc, iron and manganese) metals will form a 1:1 (curcumin to metal ion) as well as a 2:1 (curcumin to metal ion) complexes.</p> <p><b>Methods/Materials</b> MATERIALS: Curcumin, zinc acetate, copper (II) acetate hydrate, iron (II) acetate, manganese (II) acetate tetrahydrate, ethyl alcohol, Vials, Spatula, Analytical balance, Water Bath, TLC sheets, Parafilm, Centrifuge. METHODS: Curcumin and metal ion salts were dissolved in ethyl alcohol. The metal ion solution was then added to the curcumin solution. All eight different mixtures were then put into the water bath at 37 oC. The complexes were then isolated, washed and dried and used for analysis. I had two variables: 1) different metal ions 2) different concentrations of curcumin. Different concentrations were mixed together with a 1:1 ratio of curcumin to metal ions and a 2:1 ratio to see what the effect of the curcumin would be. My sample size was eight. I isolated the complexes and got their weight, This was used to calculate the yield of the complexes that were collected. These complexes were analyzed using mass spectrometry in order to get their molecular weight.</p> <p><b>Results</b> I found that all four metal ions formed complexes and there was a clear precipitate. The colors varied and I was able to isolate them. Mass spectra of all the complexes revealed the presence of curcumin and metal ions in them. Copper and Iron had a tendency to form a 2:1 complex in the 1:1 experiment. In the 2:1 experiment they formed both a 1:1 and 2:1 complex. Zinc and manganese had a tendency to form 1:1 complexes with curcumin.</p> <p><b>Conclusions/Discussion</b> My conclusion is that curcumin has an ability to form strong complexes with metal ions It created a complex with all the metal ions we studied which we were then able to isolate. Since it is known that curcumin enters the brain it is possible that it may help in AD by getting rid of excess metal ions.</p>	
<b>Summary Statement</b> Curcumin, a house-hold asian spice can remove excess metal ions from the brain and help Alzheimer's disease	
<b>Help Received</b> Used lab equipment at University of California-Irvine under supervision of Dr. Mukherjee (my dad) and Ms. Daphne Collins	