



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Shirin I. Pillay</b>	<b>Project Number</b> <b>S1422</b>
<b>Project Title</b> <b>Examination of Regeneration in Mammalian Auditory Hair Cells</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Many animals, excepting mammals, can regenerate sensory auditory cells (hair cells). The objective of this project examined various concentrations of retinoic acid on the potential generation of hair cells in transgenic mice cochleae.</p> <p><b>Methods/Materials</b> Tissue culture was collected, placed in-vitro with varying concentrations of <math>1 \times 10^{-8}</math> mM retinoic acid, and incubated at high humidity. Photos were taken for both initial and secondary cell location and population. The experiment was repeated to establish a base survival population for control conditions and each concentration of retinoic acid. A comparison on the effect of retinoic acid between segmented portions of the cochlea was also done.</p> <p><b>Results</b> Most of the Green Fluorescent Protein-expressing cells had migrated out of the cochlear epithelium. Those cells within the cochlear epithelium were found to be large GFP-expressing masses, as opposed to individual cells. However, it was found that within the basal portion of the cochlea, a higher number of cells survived with respect to the retinoic acid concentration. A two-fold population increase in the hair cell survival was noted when comparing retinoic acid concentrations of 0.5 ul and 5 ul, supporting that retinoic acid encourages survival of sensory cells within the cochlear basal segment.</p> <p><b>Conclusions/Discussion</b> Previous studies had indicated the presence of retinoic acid during avian and reptilian hair cell regeneration. Under the introduction of retinoic acid, the number of hair cells within the basal segment of mice cochlea survived at a rate of 15% with 5 ul retinoic acid, as opposed to 4% survival under control conditions. Though the results do not explicitly support the hypothesis of regeneration, it does support retinoic acid having a beneficial effect on the survival rate of the cells.</p>	
<b>Summary Statement</b> This project examines a potential regenerator of the cochlear auditory hair cells, which, if found, would eliminate the need for hearing aids.	
<b>Help Received</b> Used lab and equipment at House Ear Institute under supervision of Dr. Patricia White	