



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Vinay Tripuraneni</b>  | <b>Project Number</b><br><b>S1918</b> |
| <b>Project Title</b><br><b>Inhibition of Cell Recognition and Reaggregation by Chitin and Chitinase in the Sponge <i>Microciona prolifera</i></b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>Previous research has shown that chitin may have antigenic properties leading to bronchial constriction in mice exposed to chitin (Elias, et al. 2004). The study outlined below supports the hypothesis that chitin may act as an allergen that inhibits cell-cell recognition, leading to an immune response characteristic of Reactive Airway Disease (RAD).</p> <p><b>Methods/Materials</b><br/><i>Microciona prolifera</i>, a marine sponge, was selected to demonstrate the inhibition of cell-cell recognition by chitin and chitinase as a function of reduced cell reaggregation. Cells were teased apart and diluted to a concentration of <math>1.8 \times 10^7</math> cells per <math>\mu\text{L}</math>, and specified amounts of chitin and chitinase were added to each group. The inhibition of cell reaggregation was measured through the use of a hemocytometer.</p> <p><b>Results</b><br/>The most significant results yielded an 80.1 % reaggregation inhibition at a saturated chitin concentration of 1mg/15mLs. Interestingly chitinase (alone) also inhibited cell reaggregation by 79.2% at a saturated concentration of 1 unit per 15mLs. Curvilinear graphs were derived from the data for chitin and chitinase, and the graphs had reliability coefficients of 0.82 and 0.99 respectively.</p> <p><b>Conclusions/Discussion</b><br/>Ongoing experimentation using gel electrophoresis of surface proteins suggests that chitinase may be altering the structure of the surface proteins and their attached oligosaccharides and an alteration of surface proteins affects cell-cell recognition and cell reaggregation in <i>M. prolifera</i>. Although not present in normal individuals, exposure to chitin in genetically predisposed individuals may stimulate an upregulation in chitinase production and lead to an immune response such as asthma. Thus my results support the model that chitin-induced inhibition of cell-cell recognition may be related to an immune response and possibly Reactive Airway Disease.</p> |                                       |
| <b>Summary Statement</b><br>Reactive Airway Disease (asthma) is caused by environmental irritants; one of these irritants, Chitin, may be a key factor that induces bronchial constriction.   |                                       |
| <b>Help Received</b><br>Lab space and equipment provided by Dr. Brian Tsukimura. Advisor, Mr. Wayne Garabedian, graciously purchased other experimental materials.  |                                       |