



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Ken K. Noh	Project Number S1221
Project Title Evaluating Innate Immune Response in Allergic Patients Using Temperature Controlled Basophil Activation Testing	
Abstract Objectives/Goals This study aimed to understand the effect of temperature on basophilic activation, as well as the effect of environmental factors during an allergic reaction. Methods/Materials In order to assess the severity of an allergic reaction, the developed Basophil Activation Test Assay (BAT Assay) was implemented. Whole blood taken from peanut-allergic patients was incubated with RPMI (negative control, growth hormone), anti-IgE (positive control), and peanut extract. After incubation, degranulation is stopped and cells are stained with fluorescent antibodies. On basophils, CD63 and CD203c are surface proteins which only become expressed during activation/degranulation. Thus by using CD203c-PE and CD63-APC, we tag the activated basophils which can later be recognized and isolated by flow cytometry. Using the flow cytometer, the cell population from the whole blood sample is narrowed down to only basophils. In this isolated population, the percentage of activated basophils indicates the severity of the reaction. By completing multiple BAT Assays at room temperature, 37, 38.6, and 42 degrees Celsius, the trend of reactivity over temperature can be accurately assessed. Results Looking at the averages of the compiled data, the negative control as well as the positive control at higher temperatures resulted in less activation. Meanwhile, the peanut extract prompted a stronger allergic response at higher temperatures. The samples completed at room temperature and 42°C varied too much to determine the trends. Conclusions/Discussion Because the peanut extract samples were more reactive at higher temperatures, unlike the anti-IgE samples, this suggests that peanut allergies may be non-IgE mediated at these higher temperatures. These results imply that allergic pathways may be triggered differently due to blood temperature. Through this, more effective methods of treatment can target certain pathways at certain temperatures. The hypothesis was partially supported; peanut extract was indeed more reactive at a higher temperature, whereas the anti-IgE and RPMI samples were not.	
Summary Statement Basophil Activation Tests were run at different temperatures to simulate changes in blood temperature during allergic reactions in order to assess the effect on the IgE mediated pathway.	
Help Received Used lab equipment at Stanford University under the supervision of Dr. Nadeau	