CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34196

Project Title

The Search for Bispecific IgG4 Antibodies and Their Biological Role in Diphtheria and Tetanus Vaccinations

Abstract

Objectives/Goals

Our objective of this project is to investigate the possibility of finding a bispecific IgG4 antibody to both tetanus toxoid and diphtheria toxoid.

Methods/Materials

Human serum samples,TT,DT,IgG4 Human Affinity Resin,TRIS,PBS,Glycine,commercial ELISA kits for TT and DT,Biotin,Slide-A-lyzers,Affinity Column

As a part of our study, we will use an ELISA to test for human antibodies from subjects immunized with tetanus toxoid and Diphtheria toxoid. All samples that are positive for anti-TT and anti-DT antibodies in the screening assay will then be purified for IgG4 through an affinity column using a reagent that can bind only serum human IgG4 antibodies. After the purification was finished, the IgG4 was then dialyzed to remove any contaminants such as buffer salts and other small particles. Once the IgG4 was collected, we tested for IgG4 antibodies to both immunized antigens, TT and DT.

Results

As a result, we were able to find that a few samples had been bispecific to IgG4. In order to be certain that we would be able to find good data, we made each sample a triplicate and had done two different dilutions. We had to assume that our data showed bispecific IgG4 antibodies is because of how the purification process went. We were unable to collect enough protein that could then be used on our bridging assay. The answer as to why this occurred is still unknown, but we have found that possible sources of error could have been that our resin bed was too old or we could have eluded the IgG4 from the column. In perspective to the data we found through the purification process, we were not able to use the purified IgG4 from the patients# samples to definitively prove our hypothesis. Instead, we took the five highest and the five lowest patients# samples and tested those on our modified bridging assay procedure.

Conclusions/Discussion

Through our study, we found that there are bispecific IgG4 antibodies to both diphtheria toxoid and tetanus toxoid. We know this because previous research states that IgG4 has the unique ability to swap its heavy chains.

Summary Statement

Our project is about finding the existence of a bispecific IgG4 antibody to both diphtheria toxoid and tetanus toxoid.

Help Received

Used lab equipment at Ventura BioCenter under the supervision of Dr. Daniel Mytych, PhD.

Preliminary