CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Patricia G. Borges

Project Number

J0403

Project Title

Antibodies Bind to Proteins in a Very Specific Manner

Abstract

Objectives/Goals

The objective of my project was to determine how specific an antibody is when presented to proteins with similar amino acid sequences.

Methods/Materials

The antibody I used for my study was isolated from mice immunized with a protein called Keratinocyte Growth Factor Receptor (KGFR or FGF2RIIIc). This protein is part of a family of related cell surface receptors that bind to fibroblast growth factors. These receptors are called Fibroblast Growth Factor Receptors (FGFR) and there are several different ones known as FGFR1IIIb, FGFR1IIIc, FGFR2IIIb, FGR2IIIc, FGFR3IIIb, FGFR3IIIc, and FGFR4. These receptors have very similar amino acid sequences, but there are regions within the protein unique to each receptor.

To test the specificity of my antibody I used a technique called Western Blotting. First, I ran all the FGFR proteins on a gel. Second, I transferred them to a nitrocellulose membrane. Then, incubated the membrane with the primary antibody (anti-KGFR antibody), then a secondary antibody coupled to an enzyme that creates light, and finally exposed the membrane to film to detect the light. In any regions of the membrane where the secondary antibody was bound to the anti-KGFR antibody, the light created by the secondary antibody showed up as a dark band on the film.

Results

I observed that among all of the proteins my antibody only recognized one specific variant of the FGFR proteins and none of the others. This variant was KGFR, the protein that was used to immunize mice to generate my antibody. When I used a different primary antibody that recognized a common antigen among the proteins I used in the Western Blots, all the proteins on the membrane were detected on film.

Conclusions/Discussion

In conclusion, antibodies recognize specific antigens on proteins. If those antigens are unique to a single protein the antibody will only recognize that protein. If the same antigen is present in multiple proteins the antibody will recognize all those proteins.

Summary Statement

I tested the specificity of antibodies against proteins.

Help Received

Used lab equipment at Amgen under the supervision of Dr. Luis Borges.