CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

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Project Number

31033

Project Title

Evaluation of Monoclonal Antibodies for HER-2 Neu Status in Breast Cancer

Abstract

Objectives/Goals

An invasive type of breast cancer, identified by the amplification of the HER-2 neu gene, affects 20 to 30% of newly diagnosed patients. I evaluated Monoclonal Antibodies for HER-2 neu status in breast cancer. I predicted the Rabbit Monoclonal Antibody (RMab) without heat pretreatment applied to tissue biopsies would produce faster and clearer results. FDA approved testing using a heat pretreatment often damages the breast tissue leading to inaccurate results; and therefore, patients will not receive the proper treatment of Herceptin Therapy.

Methods/Materials

Materials include breast cancer biopsies, microscope slides, the FDA approved Mouse Monoclonal Antibody HER-24 (MMab) and a new generation of RMab SP4 and EP4. I performed the FDA recommended Immunohistochemical protocol which is a special staining process performed on formalin-fixed, paraffin-embedded breast tissue biopsies. Tissue biopsies were subjected to heat and non-heat pretreatments.

Results

The FDA test results are ranked as 0 (negative) to 4 (strongly positive) which appears as a chicken-wire pattern of intense staining and uniformity. After testing 12 breast cancer tissues, the RMab and MMab produced acceptable results with heat pretreatment. The RMab SP4 and EP4 produced good results without heat; however, the RMab SP4 with heat pretreatment yielded unacceptable cytoplasmic staining. The RMab EP4 produced a good signal with both heat and non-heat pretreatments.

Conclusions/Discussion

The results indicate that the RMab EP4 without heat pretreatment applied to tissue biopsies produced clearer and faster results to detect the overexpression of HER-2 neu. My hypothesis was correct because heat pretreatment can sometimes destroy or damage the tissues. The advantage of this experiment is that the RMab can detect these proteins without having to apply heat. Accurate detection of the overexpression of the HER-2 neu gene will benefit cancer patients because it responds to a treatment with a new target therapy called Herceptin.

Summary Statement

The purpose of my study was to compare Mouse and Rabbit Monoclonal Antibodies for the Immunohistochemical Identification of HER-2 neu status in breast cancer patients.

Help Received

Dr. Alfonso Heras, President and CEO of Bio SB, Inc. helped with the interpretation of data, and I performed the experiments in his research laboratory. Lab assistance provided by employee, Gretchen King.