CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alison M. Morales

Project Number
S1418

Project Title
Neuroprotective Efficacy of Therapeutic Progestins: Implications for Alzheimer's Disease

Abstract

Objectives/Goals
The objective is to determine whether progestins synergize or antagonize the protective action of estrogen on hippocampal cell viability.

Methods/Materials
Hippocampal neurons were treated with steroids: 17 Beta Estradiol (a form of estrogen) and Progesterone, Norethindrone Acetate and Medroxyprogesterone Acetate (which are progestins) at a concentration of 10 ng/ml to test the neuroprotective effects of Hormone Replacement Therapy on neuronal growth and survival. The toxicity for the survival and protection experiments will be induced by high concentrations of glutamate. The number of intact cells are evaluated under a microscope and analyzed with the BioQuant imaging system. Indicators of cell death and survival including LDH and Calcein AM will be measured from the medium. Flourescent intensities using these assays were measured using a microplate reader and spectrophotometer, respectively. The extensity of damaged DNA in the neurons will be measured using the TUNEL reaction mixture with a flourescent microscope.

Results
Results of these experiments revealed differences in cell viability using different techniques. Using the Survival Studies technique, Calcein AM and TUNEL assays with Medroxyprogesterone Acetate there was a significant potentiation of cell death induced by excitotoxic glutamate. The LDH technique further revealed there were no significant differences in cell viability between the three progestin-treated neurons.

Conclusions/Discussion
The data suggests that under excitotoxic conditions, certain progestins induced neuroprotection while others do not. The results have important implications for the effective design of Hormone Replacement Therapy in maintaining cognitive functions and preventing Alzheimer's Disease.

Summary Statement
My research focuses on the use of Hormone Replacement Therapy, which includes estrogen and progestin, as a preventative measure against Alzheimer's Disease.

Help Received
Used lab equipment under the supervision Dr. Roberta Diaz Brinton, USC.