CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Samantha L. Bates

Project Number
J0402

Project Title
Do Mutations in the GAG Gene Impact the Ability of HIV-1 to Kill T-Cells?

Abstract

Objectives/Goals
Human Immunodeficiency Virus (HIV) is the cause of the Acquired Immune Deficiency Syndrome (AIDS). HIV causes disease by killing the T-cells of the host and destroying the host's ability to fight infection. Replication Capactiy (RC) is an approximate measure of the virus' ability to kill T-cells. The purpose of my project is to determine whether or not mutations present in the 3' end of the Gag gene of HIV are reponsible for changes in RC, and may possibly account for differences in the ability of individual viruses to kill T-cells.

Methods/Materials
Sequenced 12 viruses (plasmid DNA) on an ABI DNA sequencer, that had no drug resistance and had not been sequenced before. In the lab I used primers and a sequencing kit, pipettemen, tubes & 96 well plates. I compared the their Gag sequences with 68 Gag sequences in the database (half had high RC >90th % and low RC <10th %). These sequences were aligned to a reference Gag sequence (NL4-3) to determine if there were mutations present that were responsible for differences in RC in wild-type HIV.

Results
The amino acid sequences from 80 different patients, 43 with low RC and 37 with high RC, were aligned on Vector NTI and analyzed. I was looking for similar mutations present in one group and not in another. There were slightly more mutations in the low RC viruses than in the high RC viruses, however; there were no obvious mutations that are present in only one of the two groups that would explain the RC differences.

Conclusions/Discussion
After aligning and comparing the sequences, I concluded that there is no clear evidence that mutations in the 3' region of Gag explain the differences in RC that are seen in wild-type HIV. Other regions of the HIV genome could be responsible for the differences in RC. Another possible explanation is that we do not have a large enough data set to see the differences.

Summary Statement
I wanted to see if mutations in the Gag gene of HIV-1 are responsible for drug sensitivity or resistance in HIV infected patients.

Help Received
Father supervised sequencing & database computer program, Virologic, Inc. allowed me the use of their lab space, database & software, Cheryl Bryan ran samples on DNA sequencer, Colombe Chappey helped me identify WT viruses in the database, Jeanette Whitcomb helped with technical problems with the