



Colorado Science and Engineering Fair

2025 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Developing a Novel Enzyme Therapy for Improving GAD and Gastrointestinal Health in Rats

Finalist's Name: Vanya Lavu

School and City: The Classical Academy High School (Colorado Springs)

Sponsor's Name: Dr. Lori Driscoll

Category: Behavioral & Social Sciences

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

The aim of the current study is to determine whether dietary supplementation with the enzymes Papain, Bromelain, and Amylase can mitigate the negative impacts of Generalized Anxiety Disorder (GAD) while helping improve overall gastrointestinal health via the gut-brain axis pathway. The study also explored IL-4 as potential biomarker for anxiety. The rat model was employed to explore the most translatable model. Rats who were 30 days postnatal were shipped from Indianapolis to Colorado Springs, a condition that naturally creates anxious behaviors. They were randomly assigned to the Control group (C), Papain/Bromelain/Amylase (PBA) group, or the Papain/Bromelain (PB) group. After being given the enzymes through drinking water for one week, the rats' anxious behavior was tested using the Elevated Plus Maze (EPM) test. This test relies on exploration and does not cause additional stress to the rodents. Additionally, rat fecal samples were taken for 16SrRNA sequencing to analyze species diversity and understand differences in the composition of the gut microbiota. Behavioral results indicate that the PBA group consistently displayed decreased anxious behaviors compared to the control and PB groups. In 16SrRNA sequencing, the PBA group was significantly different compared to the others in overall gut microbiota composition. However, there were no differences in species diversity between groups. When the ELISA was conducted, there was no difference in IL-4 levels presented between test groups. Future studies should employ more rigorous models of testing to more clearly understand microbial alteration and test for other potential biomarkers such as IL-2 or IL-8.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**