Student Research Conference Abstract
Tessera Strand

The twenty enzymes known as aminoacyl-tRNA synthetases (aaRS) are crucial components in protein synthesis. Specifically, each aaRS is responsible for catalyzing the two step reaction in which a specific amino acid (the primary structural component of a protein) is attached to its specific transfer ribonucleic acid (tRNA). Histidine transfer ribonucleic acid synthetase is one of these aaRS, whose specific function attaches tRNA to the amino acid histidine, thereby inserting histidine into proteins (Ibba 2005). Recently, a single point mutation in HARS,Y454S, was found in the Amish population, where it causes a rare disorder known as Usher-like syndrome (Puffenberger 2011). This mutation is located within the interface region of the bound tRNA and HARS complex. My research focuses on the *E.coli* HisRS version of this mutation, determined to be R375S, in order to gain a better understanding of how it affects histidyl-tRNA synthetase function. This is being accomplished through PCR mutagenesis, protein purification, active site titration assays, aminoacylation assays, and data analysis. The results obtained will allow us to test whether this amino acid substitution in the interface region influences tRNA binding specificity of HisRS. Due to the similar structure of this enzyme in all organisms (*E. coli* and humans), this could lead to understanding how the mutation works in human cells in future studies. Depending upon the findings, this research will support either the theory that Usher-like Syndrome affects HARS functioning at the levels of protein synthesis or at some non-canonical of this enzyme.

<u>Supporting Citations</u>

Ibba, Michael, Christopher Francklyn, and Stephen Cusack. 2005. The Amicoacyl-tRNA Synthetases. Eurekah, Texas.

Puffenberger, Erik, et al. “Exome Sequencing Accelerates Novel Disease Gene Discovery”. Publishing in progress (2011).