CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Matthew S. Moser

Project Number

S2117

Project Title

The Metalloprotease Inhibitor, 1,10-Phenanthroline, as a Lead for Finding Drugs to Kill Brugia pahangi Worms

Abstract

Objectives/Goals

The objective of my project was to inhibit the proteolytic enzymes of adult and microfilariae Brugia pahangi using protease inhibitors to see if protease inhibitors could kill these parasites.

Methods/Materials

I tested various classes of protease inhibitors (serine, cysteine and metalloprotease) on the adult and microfilarial stage of Brugia pahangi as well as on the adult and larval states of Caenorhabditis elegans. The worms were incubated in 24-well plates with media (RPMI for Brugia and M9 for C. elegans). The inhibitors were added in high and low dosages. The survival of the adult Brugia worms was quantified using a #Worminator#, while the small worms (microfilariae and C. elegans) had their survival rate recorded visually using a microscope. I used a scale from 0 to 5, with 0 = dead and 5 = very active.

Results

The metalloprotease inhibitor, 1,10 Phenanthroline (1,10 P) caused the greatest mortality on the adult Brugia at high (120uM) and low (24uM) concentrations within the first 24-hours of the assay. The microfilariae were not only killed by 1,10 P drug but also with high concentrations of a cysteine protease inhibitor, K11777. The low concentration did not have any effect on the microfilariae. C. elegans adults and larvae were killed by high concentrations of 1,10 P.

Conclusions/Discussion

Overall the metalloprotease inhibitor 1,10P had the greatest effect on both the parasitic worm, Brugia and the free-living nematode, C. elegans. For a further study, I looked through the ZINC database for any drugs that a similar compound structure as 1,10 P. There was only one drug that had a similar chemical structure to 1,10 P and I would be interested in investigating this drug, as well as other metalloprotease inhibitors, on the worms to determine if they could be a potential anti-parasitic drug for lymphatic filariasis.

Summary Statement

My project tested different protease inhibitors on Brugia pahangi adult and microfilariae to see if these compounds could kill the parasite.

Help Received

Dr. Judy Sakanari at UC San Francisco helped mentor me; Used lab equipment in her lab under her supervision