Academic Year 2012-2013 URISC Report

Investigating the Toxicity of Polycyclic Aromatic Hydrocarbons (PAHs) in Developing Zebrafish

by Annika Swanson

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Faculty Project Advisor: Dr. Robert Tanguay

Amount awarded: $1500

Summary

URISC funds were used to support my hourly wage while working in the Tanguay Lab during the school year. I began the funding period working in OSU's Sinnhuber Aquatic Research Laboratory (SARL). My goal was to help develop a novel AHR2-knockout fish line for use in studies examining the toxicity of environmental pollutants such as polycyclic aromatic hydrocarbons (PAHs). These zebrafish have a mutation in the gene *ahr2*^{hc3335} which is a gene that codes for the aryl hydrocarbon receptor 2 (AHR2) protein. The mutation causes the AHR2 receptor to become non-functional. AHR is a protein in an important signal transduction pathway that mediates toxicity of certain compounds, such as PAHs, and is conserved across vertebrates. AHR2 is one such AHR paralogue found in zebrafish. The ultimate goal for the lab in having a functional AHR2-mutant line is to investigate the roles of other similar AHR receptors and to further determine the roles of AHR during development.

Next, I began to form a thesis project for the Honors College at OSU. As of now, I am planning to investigate the effects of the PAH benz(a)anthracene (BAA) on specific gene expression of AHR2-mutant zebrafish. During the 2012-2013 academic year, I worked with a graduate student to design primers for specific genes located in the zebrafish genome. The genes tested included *plac8-onzin-related-protein-3* (*ponzr3*) and *ponzr4.* I used polymerase chain reactions (PCR) and a comparative C_T method to confirm microarray data of expression changes in these genes in AHR2-mutant zebrafish upon exposure to BAA during development. I have begun to analyze the PCR data in Excel to calculate the fold change of gene expression. Complete data analysis and further investigation into the impact of BAA on gene expression and the resultant toxicity will be continued in fall of 2013 and the work will later be published in my UHC thesis.

URISC Award Benefits

The URISC award enabled me to continue to conduct research while paying out-of-state tuition and completing my junior year at OSU. During my time in the lab, I was able to gain a greater perspective on the possibilities for my future and details on the requirements for applying to graduate school and for a postdoc position later on. Meeting with and receiving advice from Dr. Tanguay and my graduate student mentor of three years, Britton Goodale, has been invaluable. Being able to work in the Tanguay lab has allowed me to explore different options for my future career such as working at a university as a professor with my own lab and in finding research opportunities abroad. This year I have gained more independence in the lab, and because of this I have become more comfortable conducting experiments such as zebrafish genotyping and using PCR to analyze gene expression changes. I know that the proficiency gained from practicing lab techniques on my own will be valuable in graduate school and will hopefully allow me to learn and excel at new techniques more quickly in the future. The funding from URISC has not only allowed me to spend more time in the lab gaining more experience, but I have also been able to conduct preliminary experiments for my Honors College thesis project at OSU.