A.

Name: Michael Naleway

Title: “Development of Multifunctional Nanomedicine Platform for Combinatorial Treatment of Breast Cancer”

Faculty Advisor: Dr. Oleh Taratula, Dept. of Pharmaceutical Sciences, College of Pharmacy

Award: URISC Fall/Winter/Spring 2012-2013, $1800 Fellowship

B.

How URISC funds were expended: The funds were expended to fund hourly wages for my work in the laboratory.

C.

During the three terms covered by the URISC fellowship the project has progressed greatly. To achieve our goal, the development of combinatorial drug delivery system for photodynamic therapy and chemo-drugs, we started by constructing a multifunctional platform. A phthalocyanine derivative, a photodynamic therapy drug, was encapsulated inside a PPI dendrimer followed by modification with polyethylene glycol (to improve solubility in aqueous solutions) and a cancer targeting moiety. The phthalocyanine derivatives were prepared from commercially available precursors by organic synthesis and then purified by column chromatography followed by NMR characterization. Then the drug delivery system was tested in
vitro on MCF7, A2780 and PANC1 human cancer cell lines. Successful delivery was achieved and characterized by fluorescent microscopy. Optimized treatment concentrations were determined for the drug delivery system to maximize cancer cell viability decrease and minimize potential side effects. Data collected proved that the drug delivery system was effective in efficient treatment of cancer cells with significant decreases in cancer cell viability. Next, we are working toward the complete combinatorial drug delivery system for photodynamic therapy and chemotherapy anticancer drugs.

D.

The URISC award has had far reaching benefits, both personally and for the Taratula lab. During the full year covered by the URISC grant I have learned many valuable research techniques such as NMR, UV-Vis spectroscopy, cell culture and assay related techniques. URISC funds also allowed me to network with professors in the college of pharmacy, which will be invaluable as I move on to pharmacy school next year at OSU. The URISC funding has led the laboratory to complete a paper that is pending publication, and to start work on two additional papers. The promising results of the research allowed me to apply for, and receive, additional funding from the college of pharmacy Summer Undergraduate Research Opportunity which will fund my research on the same project through the end of the summer of 2013.