USE OF MEDAKA AS A MODEL ORGANISM TO EXPLORE PROTEOMIC AND GLYCOMIC RESPONSES TO MERCURY AND LOW DOSE RADIATION EXPOSURE IN FISH

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Nuclear power plants are a major source of electricity in the United States and globally, and often use water from lakes, rivers, and oceans for cooling purposes. Unfortunately, the release of radionuclides into cooling effluent with subsequent contamination of aquatic environments receiving these effluents has occurred at numerous locations throughout the world. To complicate such events, the source of cooling waters for many nuclear reactors also may be contaminated with heavy metals. Such mixtures of contaminants are of concern as both radionuclides and heavy metals can interact to negatively impact the functioning of aquatic ecosystems and human health. The detrimental effects of acute dosages of ionizing radiation are well known; however, little data are available regarding the biological responses of organisms chronically exposed to low doses of ionizing radiation and no data are available to address the expected consequences of low dose radiation exposure within environments contaminated with heavy metals. Par Pond and the Par Pond Facility located on the Savannah River Site provide a unique opportunity to experimentally evaluate co-occurring exposures to low dose radiation and mercury within aquatic organisms such as Medaka fish. The Medaka fish (*Oryzias latipes)* is a model organism for which the genome has been described and which provided an excellent study organism (e.g., mature early and high reproductive potential) for evaluation of sub-lethal effects of radiation and mercury co-exposure. Our long term objectives are to utilize proteomic and glycomic approaches to understand the whole body effects of radionuclide and mercury co-exposure on Medaka; however, our work this summer focused on mastering the culture of Medaka. Specifically, our goal was to increase the Par Pond Radioecology Laboratory Medaka stock to 400 individuals. We housed breeding pairs in Pentair Aquatic Habitat Units and 10 gallon aerated tanks. We collected a total of 7,052 eggs; to date 6.8% of the collected eggs have hatched. Thus, the Medaka culture currently has 673 individuals: 191 adults and 482 fry. Methodological changes to existing culture protocols (e.g., egg care and collection) increased fry production; implications for future projects will be discussed.