

## **The Role of *ndg-4* and *nrf-6* in Yolk Protein Transport in the *C. elegans***

Madeline Heidel

Marquette University

Faculty Mentors: Dr. Allison Abbot and Dr. Edward Blumenthal

The *nrf-6* and *ndg-4* genes in the *C. elegans* encode for a novel family of transmembrane proteins that are also homologous to the *drop dead* (*drd*) gene in the *Drosophila*. The proteins encoded by these genes are predicted to have 12 transmembrane domains with similar N-terminal domains and C-terminal tails. The functions of these proteins are not yet well understood. *Drd* mutants exhibit female sterility, while *nrf-6* and *ndg-4* mutants have both pale eggs and a high embryonic lethality rate. *nrf-6* and *ndg-4* mutants also display resistance to sterility induced by exposure to the fatty acid DGLA. This is likely due to the defects in *nrf-6* and *ndg-4* mutants in lipid transport into the reproductive tract.

By studying *nrf-6* and *ndg-4* mutants, we have been able to observe the pale egg phenotype more clearly by using a VIT-2::GFP reporter. Through this technique we have observed the misplacement of yolk outside of the embryos in *nrf-6* and *ndg-4* mutants that likely causes the pale egg phenotype. Although expression of the *vit-2::gfp* transgene in a wild-type background causes no defects in fertility, expression of the transgene in *nrf-6* and *ndg-4* mutants results in a strong synthetic sterile phenotype. This may be due to the additive effects of partially impaired lipid transport in the presence of the *vit-2::gfp* transgene and in the absence of *nrf-6* and *ndg-4*.

The goal of this research is to use forward genetic screens in *C. elegans* to identify genes that interact with *nrf-6* and *ndg-4*. We will be taking two approaches to identify genes that interact with *nrf-6* and *ndg-4*. We will perform a genetic screen to identify genes that when mutated can suppress the synthetic sterile phenotype of *nrf-6;vit-2::gfp* worms, using RNAi to knock down the activity of *nrf-6*. Secondly, we will perform a genetic screen to identify additional mutations that can phenocopy the resistance to DGLA-induced sterility. The identification and characterization of genes that interact with *nrf-6* and *ndg-4* will help elucidate the normal function of these genes as well as the *drd* gene in *Drosophila*.