Evaluation of RHO-1 (GF) Effects on Ovulation and Calcium Signaling in C. elegans Spermatheca

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Introduction

• The C. elegans spermatheca is a tractable in vivo model system to examine how mechanical forces are interpreted and transformed into biochemical signals by cells.

• In C. elegans, the spermatheca is the location of oocyte fertilization. It is a genetically encoded calcium sensor that is used to detect and quantify the presence of calcium through its fluorescence.

Materials and Methods

Data Collection:
• DIC and fluorescent widefield microscopy were used to image and collect ovulation movies through SPOT imaging software.
• Movies were then analyzed using Fiji ImageJ software.

Methods:
• RHO-1 is a genetically encoded calcium sensor that is used to detect and quantify the presence of calcium through its fluorescence.
• Worm Lines:
  - QT47: RHO-1 Gain of Function (GF)
  - UN5417: GCaMP Labeled Spermatheca
  - QT47/UN5417: RHO-1 Gain of Function (GF) with GCaMP Labeled Spermatheca

Materials:
• SpV-1 drives cytoskeletal actinomyosin contractions in C. elegans spermatheca.
• SpV-1 is a GAP that links changes in membrane curvature to regulate RHO-1 activity specifically SpV-1 localizes to the membrane when the spermatheca is folded and dissociates from it when stretched.

Our current lab is focused on determining a molecular pathway by which this process is regulated.

Previous Findings

• SpV-1 drives cytoskeletal actinomyosin contractions in C. elegans spermatheca.
• SpV-1 localizes to the membrane when the spermatheca is folded and dissociates from it when stretched.
• SpV-1 localizes to the membrane via an FBAR domain.

• RHO-1 is a GTPase that causes actomyosin contraction.

Objectives

1. Determine the effects that RHO-1 Gain of function (GF) has on oocyte transit through the spermatheca.
   - Develop heat shock protocol.
   - Develop parameters used for quantification.

2. Cross RHO-1 (GF) to GCaMP labeled spermatheca line to determine the effects that RHO-1 (GF) is having on calcium signaling.

Results

Conclusions

Acknowledgements and References

References: