

Understanding the role of small non-coding RNA in bumble bee reproduction – Survival analysis

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Introduction

The goal of my study was to investigate the role of small, non-coding RNAs in bumble bee reproductive physiology.

- ***Bombus impatiens***: the common eastern bumble bee. Found in the eastern United States, southern Canada, and the eastern Great Plains.
- **microRNAs**: are small, non-coding RNA molecules that regulate gene expression.
- **miR-13b**: the name of the microRNA targeted in this study.
- **Antagomir**: a single stranded RNA complementary to miR-13b; a synthetic inhibitor sequence.
- **Knockdown**: the process of interfering with miR-13b so that it can no longer regulate gene expression.

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Methods

We created a protocol to inject 2-day old bees with the antagomir of miR-13b. We looked for effects of the antagomir on ovarian and fat body development in *B. impatiens* abdomens as they aged.

1. Bee samples received an injection of 450 nmol or 900 nmol of the antagomir or scrambled (control) solution.
2. Bee samples were assigned to a treatment length of 1, 2, 4, or 8 days after injection.
3. To analyze survival, a Kaplan Meier Curve and Cox Proportional Hazard Regression was coded using R-software.

The Knockdown Pathway

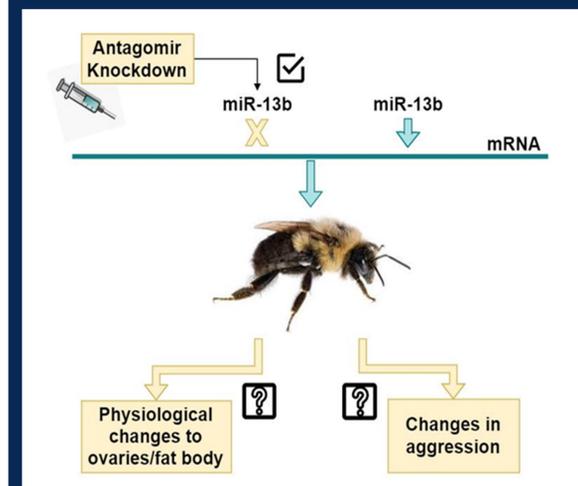


Figure 1. Experimental design. miR-13b function is knocked down by administering an antagomir injection. This may lead to changes in reproductive physiology or behavior.

Results

We did not find any significant differences in survival or hazard risk associated with treatment or dose.

Conclusions

Future experiments will assess physiological and behavioral changes in *B. impatiens* after miR-13b is inhibited.

This will provide important insight into the molecular mechanisms regulating reproduction in these important pollinators.

Cox Proportional Hazard Ratio & Kaplan Meier Curve

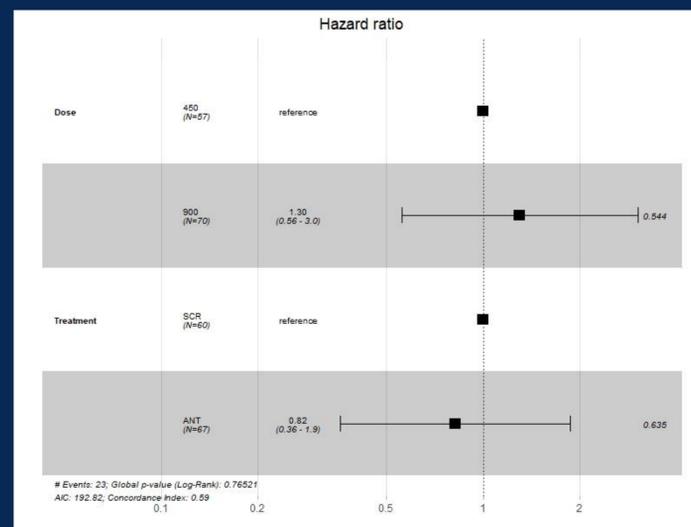


Figure 2. Different doses and treatments did not significantly influence the hazard ratio.

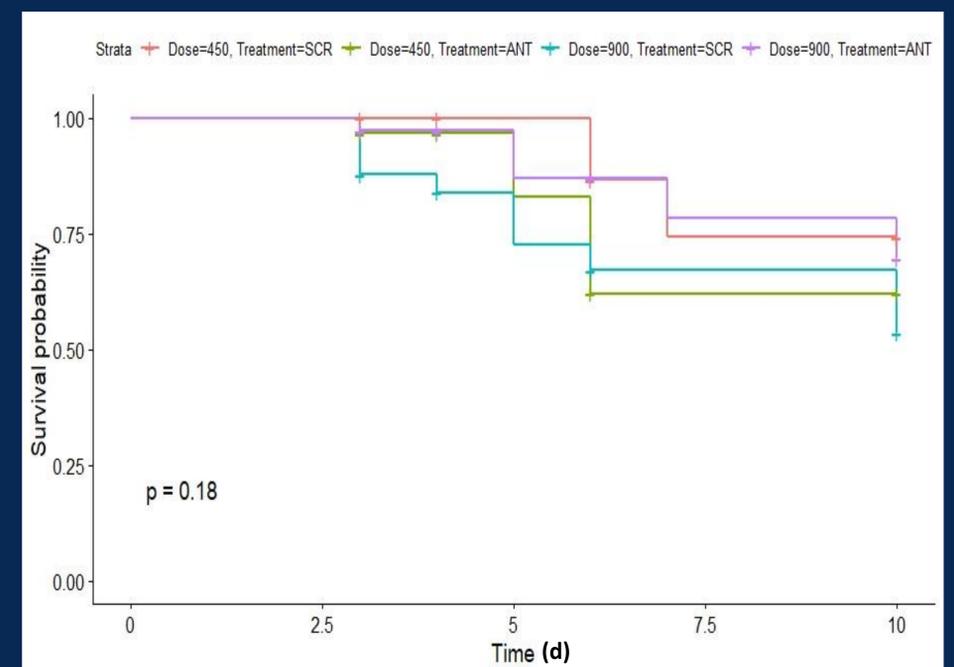


Figure 3. Survival of bee samples based on assigned treatment length and dose.