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BIOS 967

Independent Project Proposal

Introduction

The transparent, bacterivorous nematode *Caenorhabditis elegans* has been developed as an exceptional model organism. The canonical wildtype *C. elegans* strain N2 was isolated from a mushroom compost near Bristol, England and is highly domesticated [1]. This strain has been used by the XXX lab for decades. However, we have noticed that our N2 worms have not been consistently behaving as expected on laboratory control *Escherichia coli* OP50. Recent preliminary survival data from the XXX lab shows that N2 worms are living substantially shorter lives than expected. Data published by a previous lab member indicates that the mean lifespan of wildtype worms on OP50 is 8.53 days [2]. Additionally, unpublished data from a previous lab member suggests that the TD_{50} (time at which 50% of the population has died) is 9.59 days. We believe these measurements to be an accurate representation of N2 lifespan on OP50. To determine if this disparity is due to issues with the worm strain or with the bacteria strain, diagnostic survival experiments with two different N2 worms and three different OP50 cultures were performed. Kaplan-Meier curves, average lifespans, and TD_{50} values were compared to mitigate this problem.

Objectives

(1) Create Kaplan-Meier curves using the survival data.

(2) Calculate the average lifespan and TD_{50} for each experimental group of nematodes.

(3) Use a Cox proportional hazards test to quantify the differences between nematodes and bacterial treatments by generating hazard ratios and p-values.

(4) Perform an analysis of variance (ANOVA) test to detect significant differences between nematodes, bacteria treatments, and the interaction between these two variables.

Methods

This survival data was collected over the course of a three-week period. Batch A of this data was collected by me, while Batch B of this data was collected by XXX of the XXX Lab. In this experiment, two strains of *C. elegans* were used, the strain formerly being used in the lab and an older strain obtained from a frozen stock. Three strains of *E. coli* OP50 were used, the strain formerly being used in the lab and two older strains obtained from a frozen stock. Twelve synchronized larval stage 4 (L4) worms were transferred to a plate of nematode growth media (NGM) seeded with 75 μl of the bacteria treatment. The number of living nematodes on each plate was counted and recorded each day, and dead carcasses were removed. The status, or whether or not the worm's carcass was able to be located upon death, was also noted. For the first several days of the experiment, worms were moved to new plates to separate them from their progeny. For the remainder of the experiment, worms were only moved to new plates if there was a contamination.

References

[1] Sterken MG, Snoek LB, Kammenga JE, Andersen EC. The laboratory domestication of Caenorhabditis elegans. *Trends Genet*. 2015;31(5):224–231. doi:10.1016/j.tig.2015.02.009

[2] White CV, Darby BJ, Breeden RJ, Herman MA. A Stenotrophomonas maltophilia Strain Evades a Major Caenorhabditis elegans Defense Pathway. *Infect Immun*. 2015;84(2):524–536. Published 2015 Dec 7. doi:10.1128/IAI.00711-15