The Effect of Sodium Nitrate on the Fitness of Caenorhabditis elegans: Phase Two

Wymer, Olivia (School: Central City High School)

This study was performed to increase awareness of the potential risks of high levels of nitrates. My goal was to determine how sodium nitrate affects the model organism Caenorhabditis elegans (C. elegans) fecundity as a measure of fitness. C. elegans are 1 mm transparent nematodes that develop in 2 to 4 days. C. elegans are a good model for humans because they share many conserved gene functions with humans, are simple, and have a fast life cycle. I hypothesized that sodium nitrates would affect the number of progeny produced by C. elegans. C. elegans were treated with three sodium nitrate concentrations, one sodium chloride concentration, and one control with neither, and were observed throughout the reproductive cycle. Data collected showed significantly less progeny were produced at 50 and 100 μM sodium nitrate concentrations. The results suggest that increased sodium nitrate concentrations, and not osmolarity, may cause organismal stress that reduces the number of eggs produced. To continue the study, I would like to look at the effect of sodium nitrate on C. elegans' reproductive organs by observing the organs with a microscope with differential interference contrast (DIC) imaging. Also, I would like to see if sodium nitrate affects other organisms' reproductive cycle. In addition, I am interested in testing for specific DNA-damage "hot-spots" in the genome, which might be more susceptible to nitrate-induced damage and drive cancer risk with a more focused panel of nitrates, like sodium nitrate and calcium nitrate.

Awards Won: