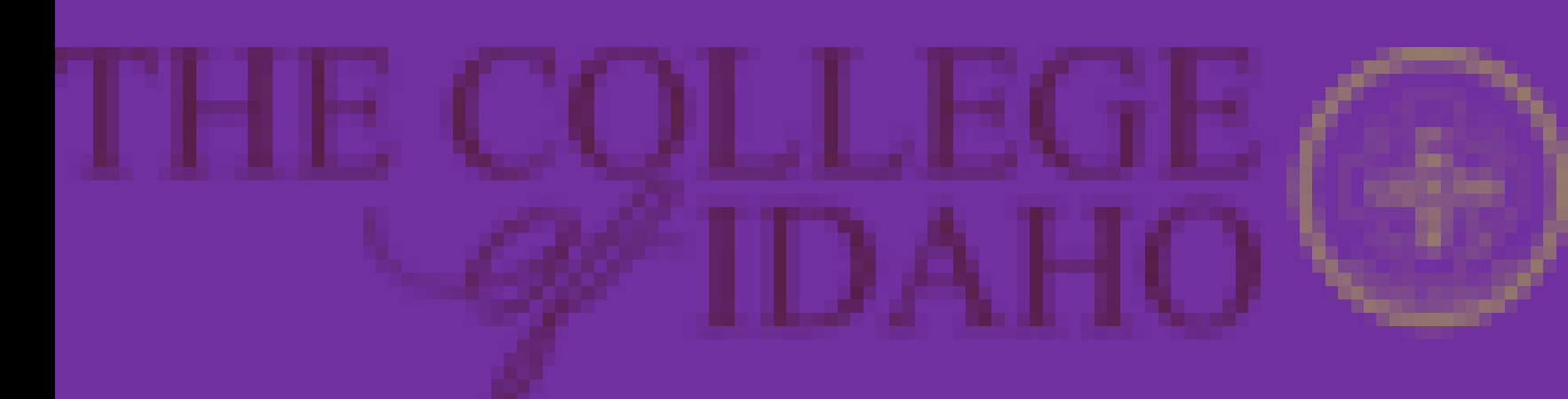


Assessing The Hazard of E-Cigarette Flavor Mixtures Using Quail Hearts

By Pedro Galvan, Julia Molina, Suman Dhungana, Guzal Shukur, Patrick Mark

Instructor: Thomas Pirtle

Biology Department, The College of Idaho, Caldwell, Idaho 83605



Introduction

The popularity of electronic cigarettes has increased worldwide. Electronic cigarettes are viewed as a safer alternative to smoking traditional cigarettes, although this might not be the case. The essential component of electronic cigarettes is formaldehyde, which is a product of propylene glycol. Inhaling this chemical through a vaporizer is widely unstudied because of the recent invention of the product. Therefore, the long-term health effects of electronic cigarettes aren't clear yet. In this study, we wanted to research the impacts of electronic cigarette flavors on cardiac development in quail embryos. To do this, we treated each embryo with vaporized or un-vaporized electronic cigarette vaporizer flavorings on day 2 and dissected the hearts of each embryo on day 14. [1] In a recent study similar to ours, researchers assessed the hazard of electronic cigarette flavor mixtures using zebrafish. In this study, the researchers found that seven of the nine electronic cigarette flavors that they tested showed developmental responses at 1% by volume. Therefore, we hypothesized that exposure to electronic cigarette flavorings in the embryo of quail would have significant decrease in the mass of its heart.

References

[1] Holden, Laura L., Simonich, Michael T., Tanguay, Robert L., and Truong, Lisa. Assessing the Hazard of E-Cigarette Flavor Mixtures Using Zebrafish.

Methods

We used the Quail eggs from Georgia Quail Farms.

Quail eggs were incubated at 100oF until day 2 of development (48 hours) and then were treated with both vaped and unvaped e-cig flavorings (mango-strawberry, mochalicious, menthol, and cinnamon). E-cig chemical flavorings used in the experiment were purchased from The Vapor Emporium in Caldwell, Idaho (5205 Cleveland Blvd #103, Caldwell, ID 83607). The embryos developed for 14 days in the incubation and then heart was dissected from the embryos. We measured the mass (in mg) for each individual heart in each treatment group. As a control we also had a group of untreated quail eggs, a group treated with unvaped propylene glycol/ vegetable glycerin and vaped propylene glycol /vegetable glycerin (the ratio of propylene glycol to vegetable glycerin is 70:30).

Results

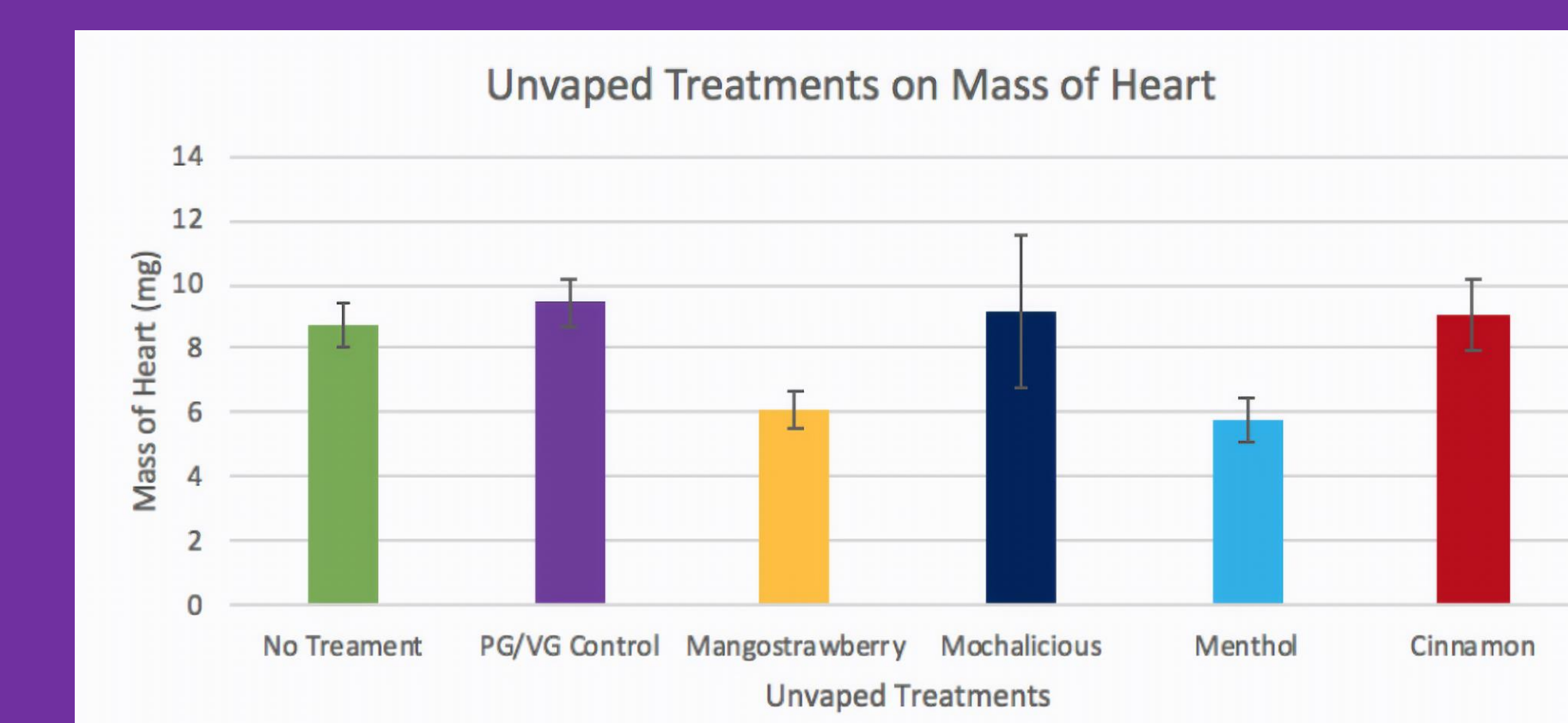


Figure 1

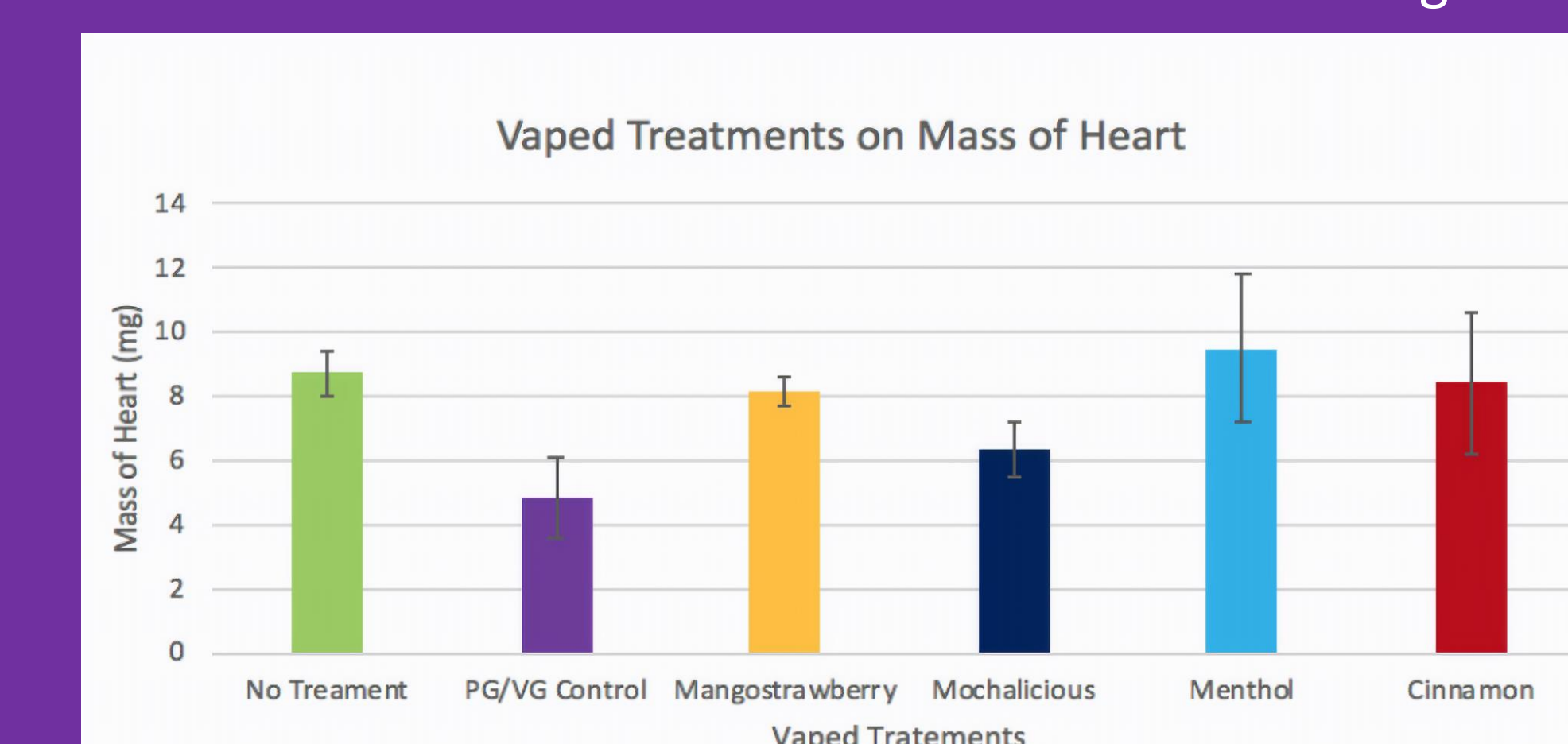


Figure 2

Using a one-way ANOVA test on the mass of heart for unvaped treatments, it was determined that the results yielded a statistically significant difference (Figure 1). However, for the vaped treatments, the statistical analysis had results that did not yield a statistically significant difference (Figure 2). For the unvaped treatments, the PG/VG control treatment had the largest average heart mass whereas the Menthol treatment had the smallest heart mass (Figure 1). Inversely, for the vaped treatments, the Menthol treatment had the largest average heart mass whereas the PG/VG Control treatment had the smallest heart mass (Figure 2).

Acknowledgements

We would like to give special thanks to the Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant #P20GM103408.

Discussion

The results supported the hypothesis that there was a significant decrease in quail heart mass treated with the un-vaped treatment. Illustrating that administering un-vaped liquid into the quail egg influences the developing heart of the quail. Although there was not a significance for vaped treatment, it may have been due to the aerosol having a greater effect on heart mass causing the quail to be underdeveloped. This would make heart extraction much more difficult resulting in unrecorded data due to unmeasurable heart mass. Future experiments may include conducting an identical study to retrieve a higher sample size. To go further and include observational aspects and view treated hearts under a confocal microscope. Also, adjusting aerosol concentrations to confirm if vaped treatment has a greater than non-vaped treatment