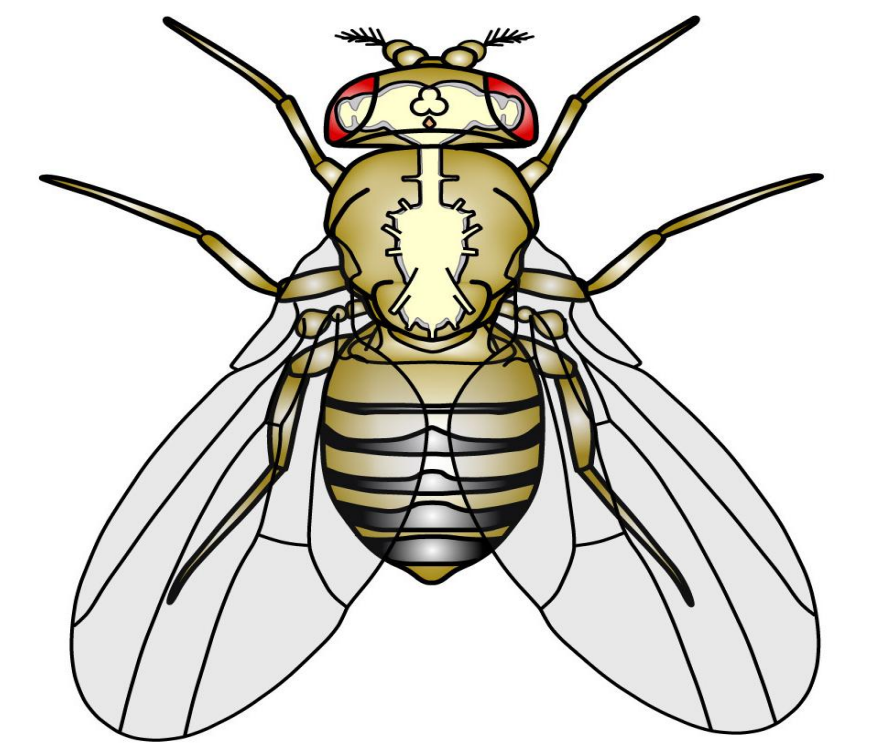


Mortality Index Analysis Following Traumatic Brain Injury in a Fruit Fly Model

Megan N. Ashworth & Kimberly Rowland, Ph.D.
Lynn University, Boca Raton, FL 33431



About Me

I grew up playing varsity softball and soccer when I was in high school, and I love watching ice hockey, baseball, and football. I was unsure what I wanted to do when I was graduating high school. I thought I had to choose between playing collegiate sports or studying biology. However, science gave me the avenue to incorporate both of my passions into one through research. I believe being a woman in the arenas of sports and science is an empowering experience that will allow me to enrich others with knowledge and lead to widespread change in how concussions are viewed, diagnosed, and treated in contact sports.

Introduction

- Traumatic brain injuries (TBI) are the leading cause of brain deficits and death worldwide (Masel BE, DeWitt DS, 2010).
- Primary injuries result from the immediate impact on the brain. An example of a primary injury is vision problems.
- Secondary injuries happen more slowly as a result of how the brain cells respond to the primary injury (Katzenberger et al., 2013). For example, brain cells will begin to release chemical messengers called cytokines that increase swelling within the brain.
- In this study, we study an example of a secondary injury: mortality.
- Fruit flies are a unique model organism to study the effects of TBI and neurodegeneration.
- Flies have a complex nervous system like humans (Chan, H., Bonini, N., 2000).
- Flies reproduce and grow rapidly and inexpensively, allowing many subjects to be studied at once.
- Experimental outcomes can be studied over the entire lifespan of the fly.

Results

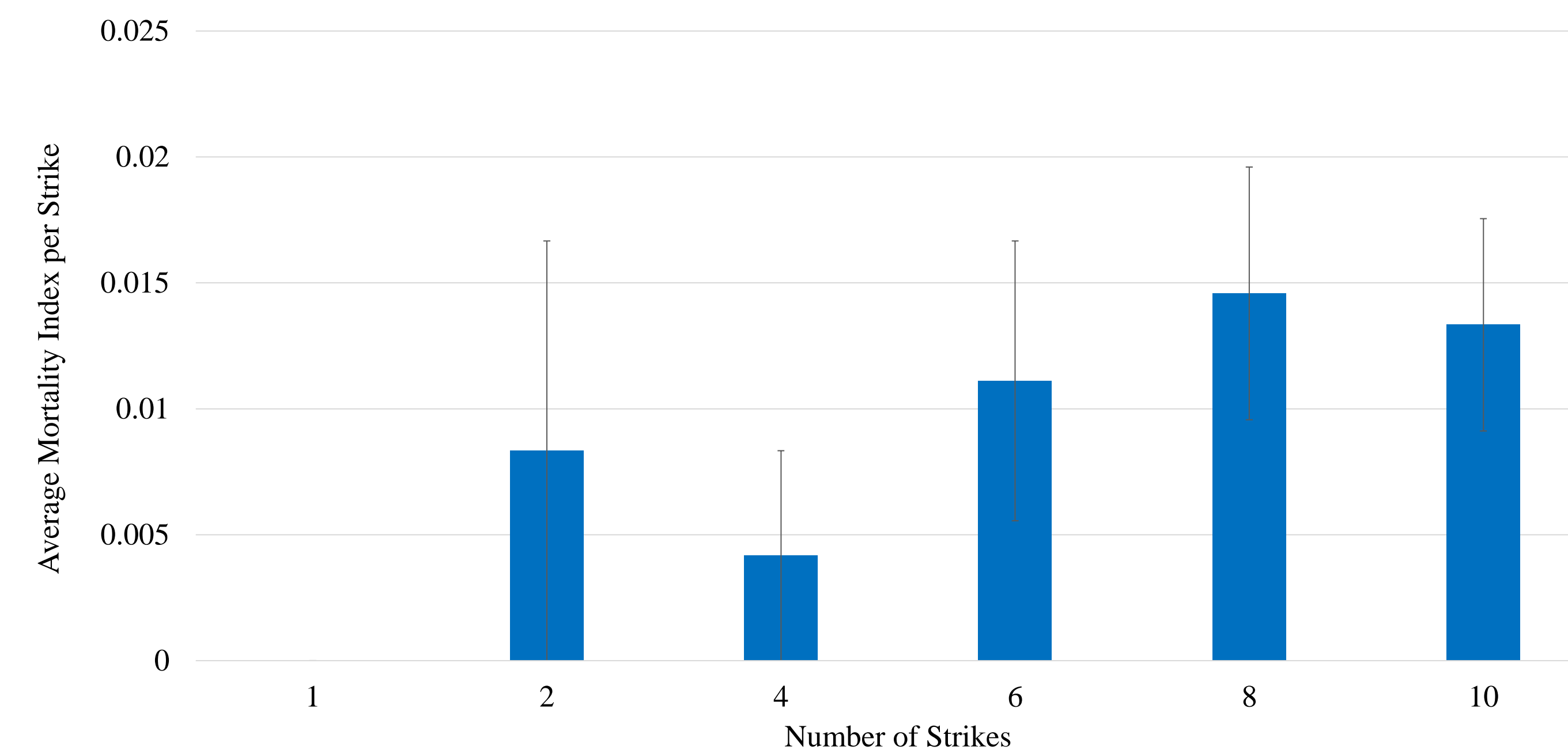


Figure 2: Average Mortality Index at 24 hours, following multiple hits

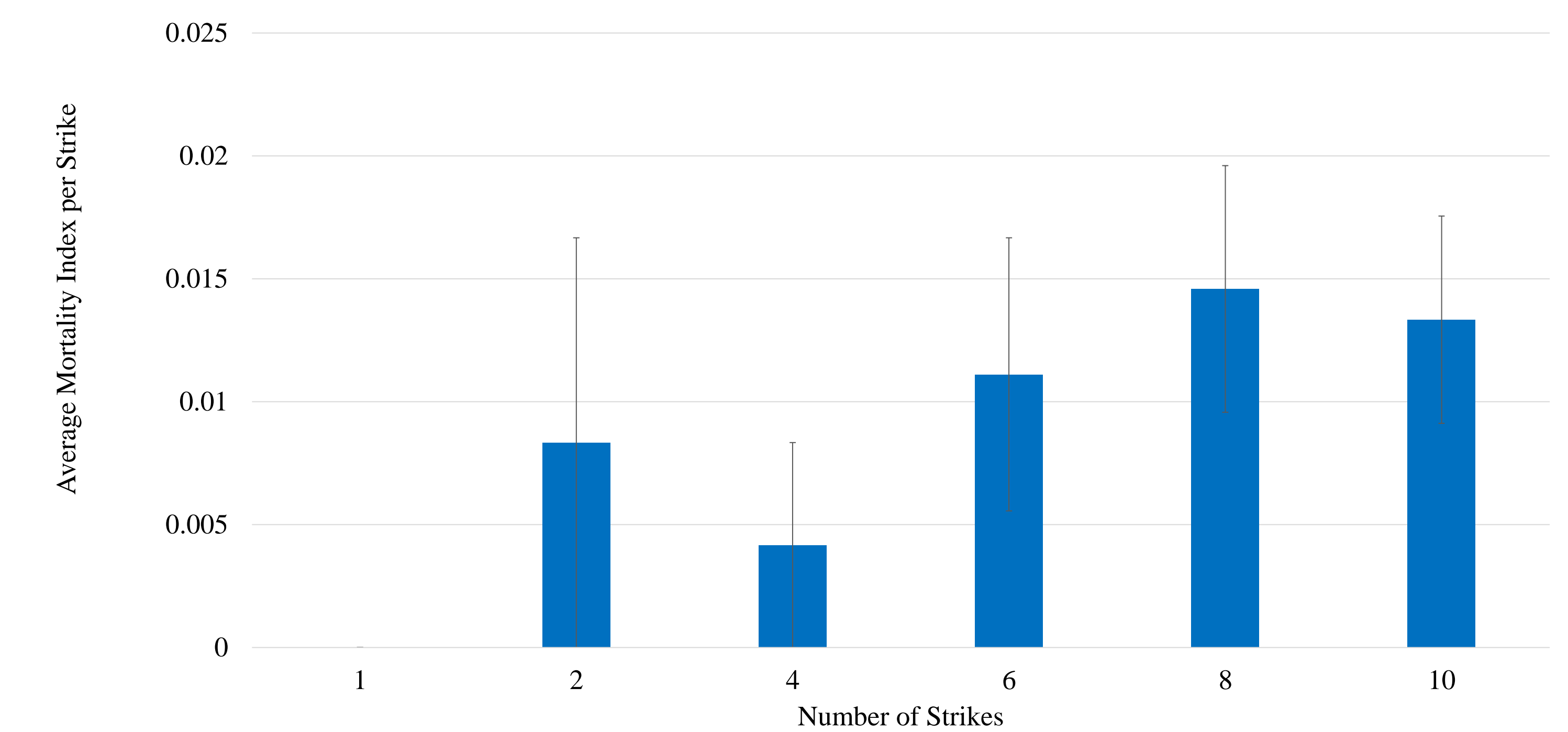


Figure 3: Average Mortality Index per Strike at 24 hours, following multiple hits

Methods

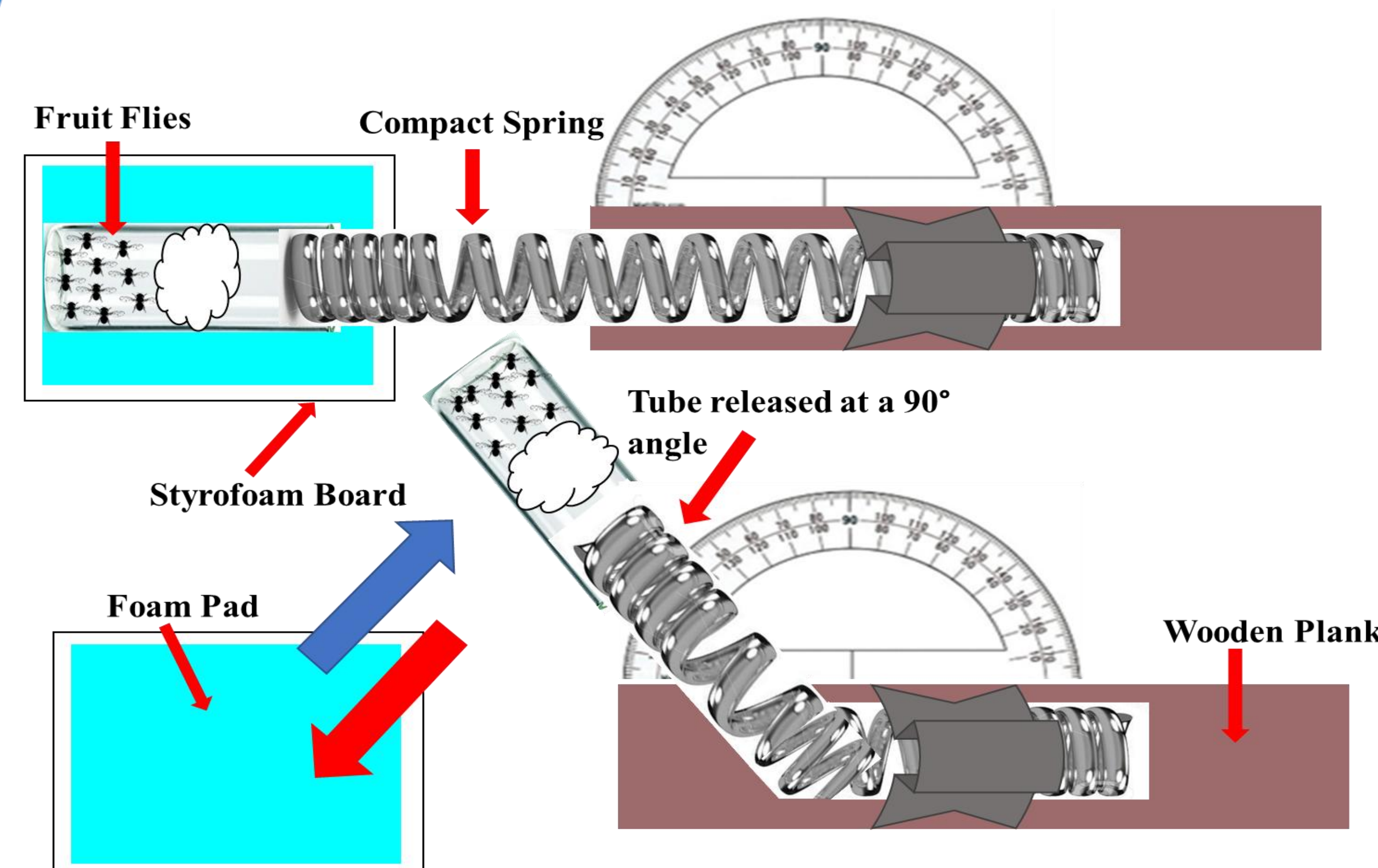


Figure 1: Diagram of HIT device. The top image shows the device in its resting position. The bottom image shows the spring being released from a 90° angle as the tube contacts the Styrofoam surface.

Discussion/ Future Directions

- Figure 3 shows that the average mortality index increases as the number of hits increases, meaning the more hits the flies were subjected to increased the likelihood of death. Results further indicate that the same percentage of flies died with each additional hit (Figure 4).
- The HIT device is a model device to study TBI because it inflicts a mechanical injury through rapid acceleration and deceleration, which are characteristic aspects of TBI events seen in humans (Katzenberger et al., 2013).
- It illustrates how the location and strength of the primary injury cause variation in TBI outcome.
- Future studies will aim to analyze primary injuries in addition to mortality. Currently, we are analyzing how TBI affects climbing and sleep patterns in fruit flies in the presence of a genetic risk factor for neurodegeneration.

References