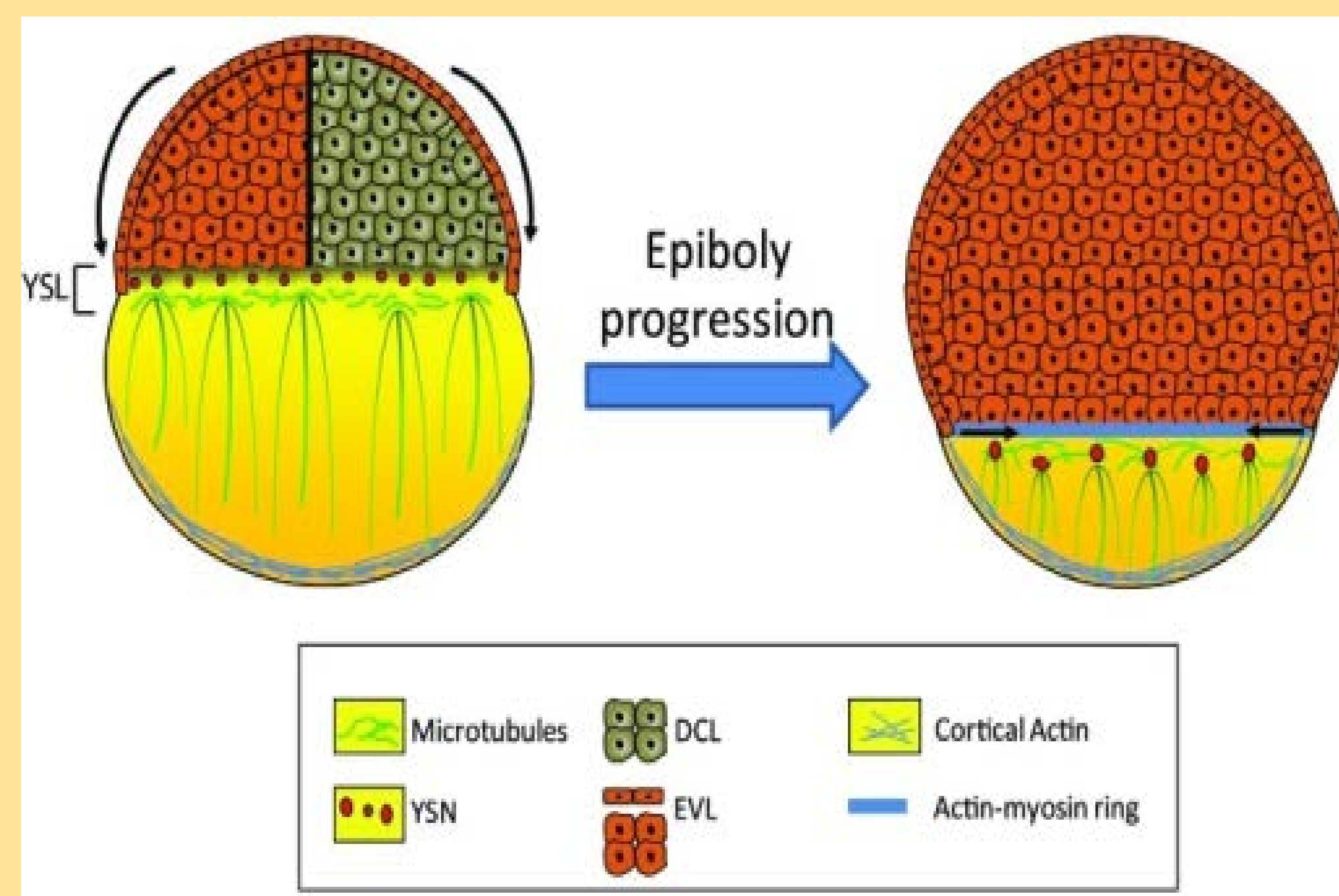


## Background information - Introduction

During the development of a zebrafish (*Danio rerio*) embryo, there are 3 stages of growth: epiboly, involution, and convergence. (Strahle and Jesuthasan, 1993) Previous experiments showed that exposing zebrafish zygotes to ultraviolet light potentially impairs the stage of epiboly, resulting in damage or death in zebrafish (Strahle and Jesuthasan, 1993). Due to this impairment from the exposure to UV light, the growth of the zebrafish would be stunted, therefore not allowing the fish to grow to adulthood. Or, at the very least, would cause mutations. This experiment will be delving deeper into the implications that irradiation of zebrafish would have on their development.

### Epiboly



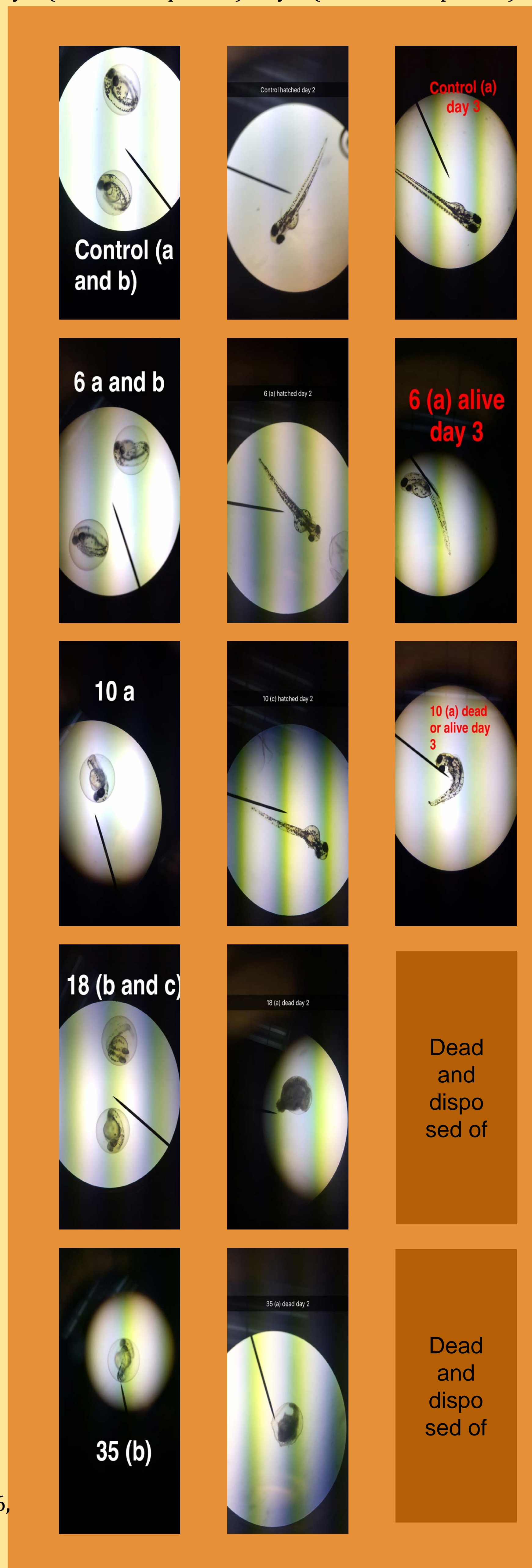
### Abstract

The purpose of this experiment was to discover the effects of different periods of exposure to UV light on Zebrafish embryo. In order to find the results of said exposure, 11 different petri dishes were prepared with 5 embryo in each dish, each labeled with either 2, 4, 6 ... 32 seconds. (only the 0, 6, 10, 18, and 35 second dishes are represented in the space to the right). For three days, the embryo were exposed to UV light using a UV Crosslinker set to 120,000 microjoules per  $\text{cm}^2$  once each day to their respective periods of time. After 3 days, and three periods of exposure for each dish, the qualitative and quantitative data proved that 10 seconds of exposure and under yielded living fish, though 4 seconds and up were fairly mutated. 10 seconds and up yielded all but one dead fish, proving that 10 seconds was the maximum amount of UV exposure that the embryo could sustain before death.

### References

Strähle, U., & Jesuthasan, S. (1993, November 1). Ultraviolet irradiation impairs epiboly in zebrafish embryos: Evidence for a microtubule-dependent mechanism of epiboly. *The Company of Biologists Limited*, 119(No.3), 909-919. Retrieved December 10, 2016, from Ultraviolet irradiation impairs epiboly in zebrafish embryos: evidence for a microtubule-dependent mechanism of epiboly. Bonneau, B., Popgeorgiev, N., Prudent, J., & Gillet, G. (2011, Sept. & oct.). Cytoskeleton dynamics in early zebrafish development. Retrieved March 10, 2017, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3384572/pdf/bioa-1-216.pdf>

Day 1 (After 1st exposure)-Day 2 (After 2nd exposure)-Day 3 (After 3rd exposure)



**NOTE: Letters such as A and B were used solely to be able to ensure repeats were not incorporated into the table. In other words, A of day 2 is not necessarily the same fish as A of day 3.**

# Irradiation of the Zebrafish Embryo

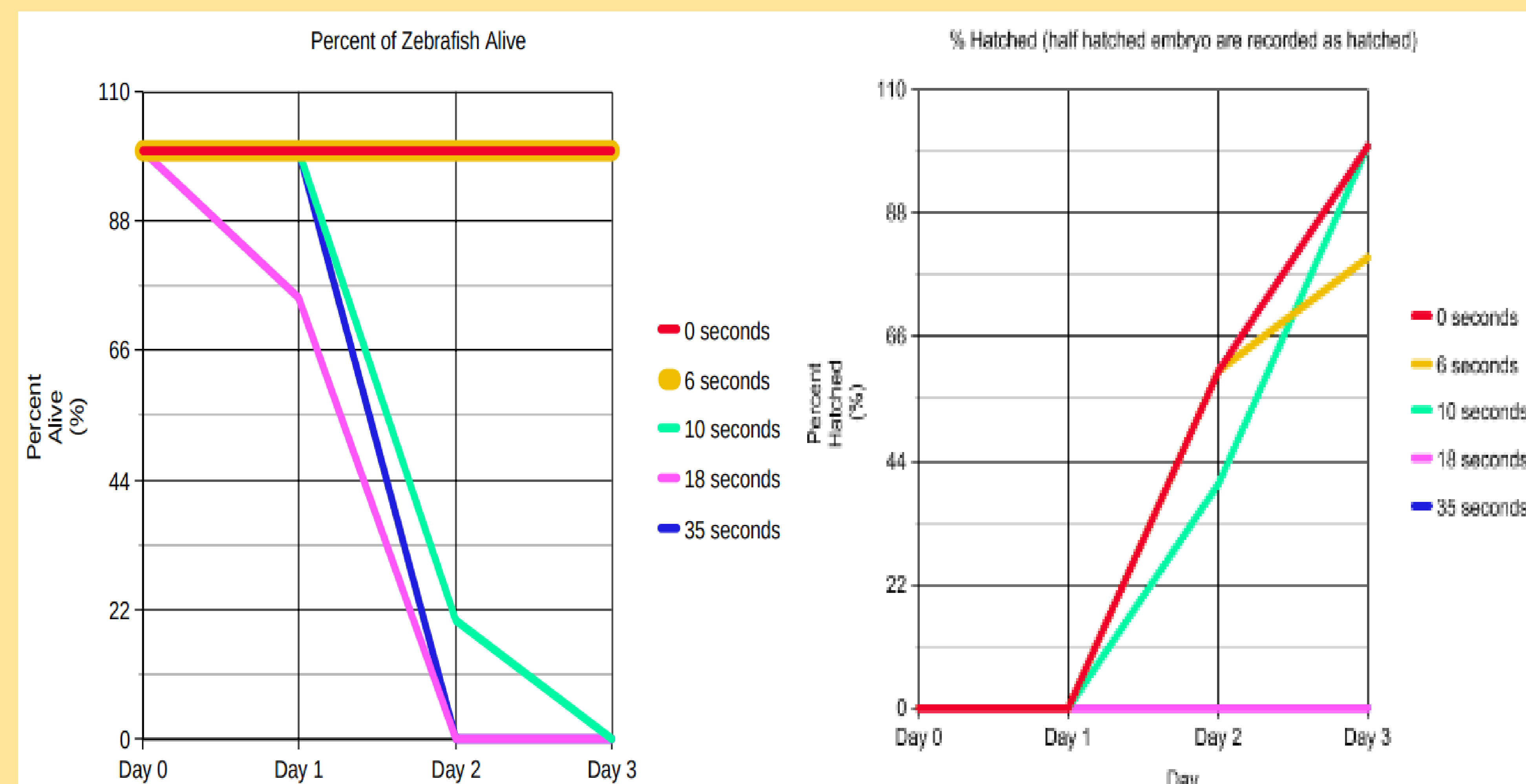
Ana Gonzalez

## Results

As the amount of days increased, more embryo died. This proved the existence of a strong positive correlation between number of days exposed and death in zebrafish. Also, as the period of time increased from 0 seconds to 35 seconds, the embryo died more often than survived. However, this death was not gradual. Upon reaching the 10 second mark, there was a very statistically significant drop in the amount of living embryo in said dish in comparison to the control (0 second) dish with a two tailed P value of (0.0039). Following the 10 second dish, the remaining embryo in the 12, 14, 16, 18, 25 and 35 second dishes all died, revealing a very strongly significant correlation between extended UV light exposure and death in zebrafish embryo. Due to how the T-Test was unable to compare this "perfect data", it is difficult to draw exact statistical significance from the data. However, due to the fact that after 10 seconds, the initial data and the final data were complete opposites, by definition, there is a very statistically significant pattern apparent.

Due to the death of every fish after the 10 second mark, the critical point (the point at which fish can no longer sustain life) can be inferred to be just over 10 seconds. This means that after 10 seconds of continuous exposure to a set amount of UV light, approximately all zebrafish embryo will perish.

In regards to hatched or unhatched zebrafish, due to the fluctuation in statistical significance and the lack of a pattern, it would be difficult to found conclusions in regards to hatched or unhatched based on the evidence from the experiment. However, in regards to overall death of zebrafish embryo, the hypothesis of this experiment was proven to be correct, as increasing the increment of time that embryo are exposed did increase the amount of deaths that occurred.



## Conclusion

All of the fish after 10 seconds of exposure died, leaving only the fish in the 00-08 second dishes living. In addition to a positive relationship present between increasing time increments exposed to UV light and zebrafish embryo death, a conclusion can also be made regarding the critical point of the embryo (the point at which the embryo was unable to survive any longer), which would be approximately 10-11 seconds, for all embryo exposed to 10 seconds or more died. A conclusion can also be made in regards to the effect that multiple days of exposure had on the embryo. As the amount of days increased, the deaths of the embryo also increased, leading to a positive correlation between increasing days of exposure and fish death.