BIOLOGY LAB REPORT:

Inquiry Lab 1 Lab Report
Ultraviolet Rays Experimentation Test with Yeast

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Introduction

The problem that people are facing today when it comes to the sun is the amount of exposure to Ultra Violet rays and how sunscreen prevents damage to then skin. This is important because UV rays have been found to cause cancer, melanoma, premature aging, and other damages to the sin and health in general (EPA). The more people see and understand that sunscreen actually protects the skin from UV rays, then more they buy into keeping themselves safe from harm. There has been a decline in the use of sunscreen among adolescence as stated by research done by Corey H. Basch and his fellow authors (Basch). This could be due to the lack of understanding of the effects of UV rays without the use of sunscreen. Ultraviolet rays are a type of electromagnetic radiation that comes from the sun, tanning beds, x-rays, and other like sources. Research from then W.S Badger Company showed that the difference between SPF protection were very little. For example, the difference between SPF 15 and 30 was just 4% ; SPF 15 blocks 93% of UVB rays and SPF 30 blocks 97% (Badger). By conducting an experiment done in the lab, the use of yeast as model organisms was used to study DNA damage when exposed to UV rays. The goal of the experiment was to understand the difference in protection between SPF 15 and SPF 30. This further educates consumers on the importance of the sun protection factor and which one works better. By using agar plates (growth mediums for yeast) and measuring the percent rate of survival of the yeast after exposure to UV light, we are able to determine which SPF works best. The hypothesis was that SPF 30 would allow an increased survival rate in the yeast organisms by 75%.

Methods

The test was done in a Longwood University science lab under room temperature conditions (approximately 70F) on September 19, 2018. The area where the test took place was sanitary as table was wiped down with 70% rubbing alcohol and determined a clean zone in order to reduce risk of contamination.

In preparation for this experiment, each plate was divided into half with a drawn line down the middle by a marker. The plates that were going to receive treatment were labeled with the number of SPF and the non treated plate was marked too. Using a strike cotton swab, the yeast was applied to a side of the plate in a streaming motion as it was demonstrated by the instructor. Once this technique was used for all three plates, they were then wrapped with clear plastic and the different SPF's were sprayed unto the plastic wrap. The SPF brand used was Coppertone and it was the same brand for both level of SPF. The foil paper was then wrapped on the one side labeled "foil" on each of the plates. The foil was used to shield a portion of the yeast from UV rays and the SPF treatment was used to test for significant difference in protection.

In being treated, the yeast was put into a UV transmitting box for 2 seconds. The foil and the plastic wrap were then taken off and the lid was put back on. It was incubated for four nights in a fridge for optimal growth and the plates were kept covered to minimize light exposure. The percentage of Yeats that survived through those four nights was what was measured at the end of the experiment.

Results and Discussion

The hypothesis being tested in the experiment was whether SPF 30 would allow an increased survival rate of yeast by 75%. *Figure 1* shows the results of the yeast treatment as interpreted by the group. The data shows a one hundred percent survival rate of yeast on the plate sides that had the foil covering them because they were protected from the UV rays. There were different survival rates for the other half of the plate that was not covered in foil. SPF 30 had a seventy percent survival rate, while SPF 15 had an unexpected ninety percent survival rate. The yeast plate with no treatment on the other hand had a ten percent rate of survival.

Yeast is fast growing organism and when put under high intensity UV rays for sunlight, the growth of the organism increases due to that fact that it breaks down the cell membranes and destroys them. This is why they are used in testing UV rays effects as they are like a model of the human skin. From the outcome of the experiment, it was shocking to see that SPF 30 and 15 had a large difference between them and also that SPF 15 was more protective of the yeast organisms than SPF 30. The explanation for this may have to do with an instance that happened with the carrying out of the experiment or just due to a chance of how the plate was stored. There could have been not enough sprayed with SPF 30 or the spray could have dripped off during the experimentation process. In this experiment, it is important to get accurate results as it could cause a decrease in demand of products like sunscreen due to lack of trust in the product. It is evident to say that the hypothesis can be supported as there is a five percent significance of evidence, (which is used as the cutoff for significance) that SPF 30 can protect up to 75% of yeast organisms.

The study was done well as the same brand of sunscreen was used for both SPF levels which could bring out a different result if it weren't the case. A limitation of the study was the lack of natural sunlight. Instead the UV box was used which could affect the severity or lack there of light intensity. Therefore, in the future, natural sunlight would be better to test the effects of SPF as it is more realistic. This experiment brings into question how other brands of sunscreen would fare at the same level of SPF and how they would compare with the one used in this experiment.

References

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Basch, Corey H., et al. "Use of Sunscreen and Indoor Tanning Devices Among a Nationally Representative Sample of High School Students, 2001–2011." Preventing Chronic Disease, Centers for Disease Control and Prevention, 21 Aug. 2014, www.ncbi.nlm.nih.gov/pmc/articles/PMC4149322/.

Figures and Tables

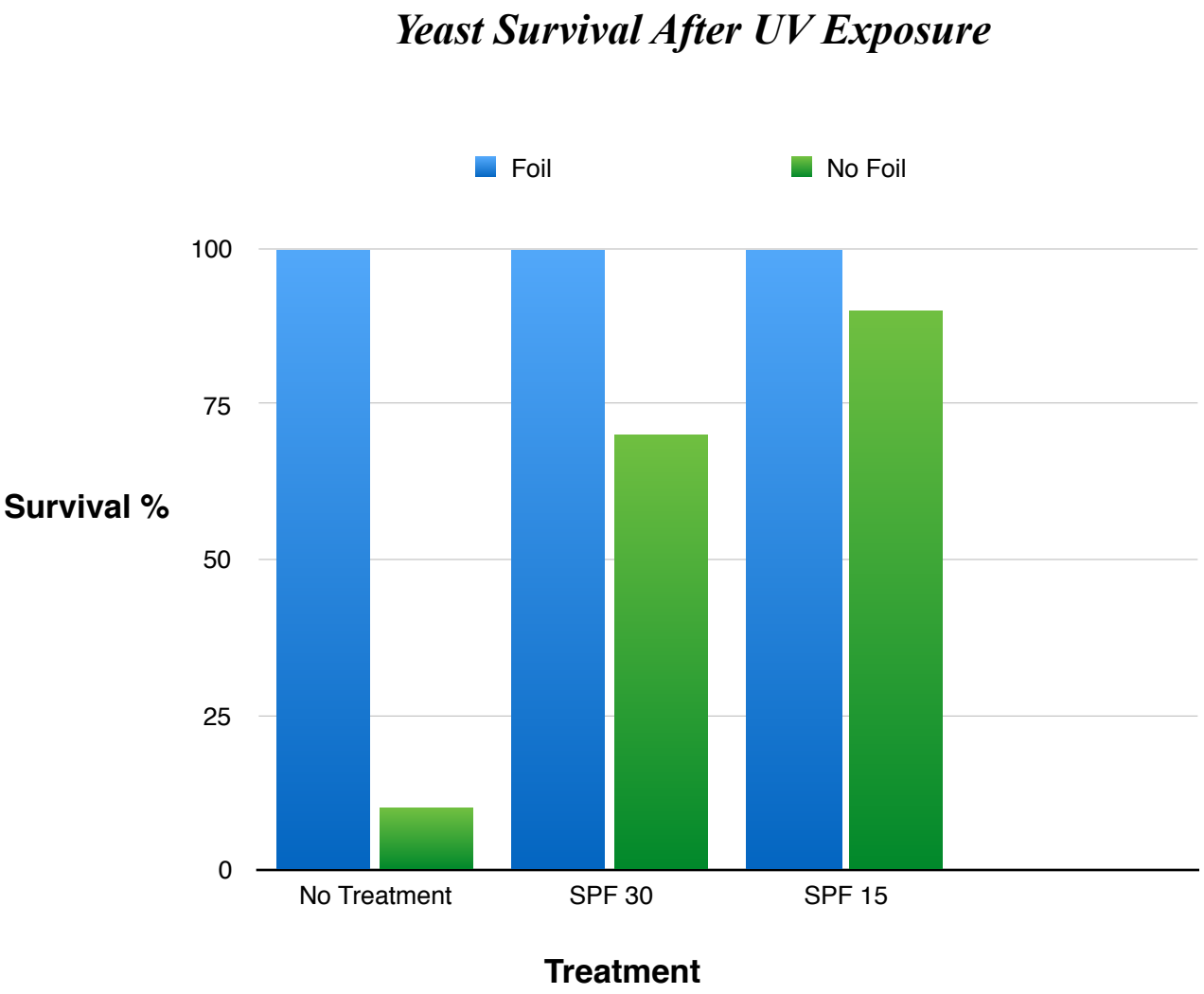
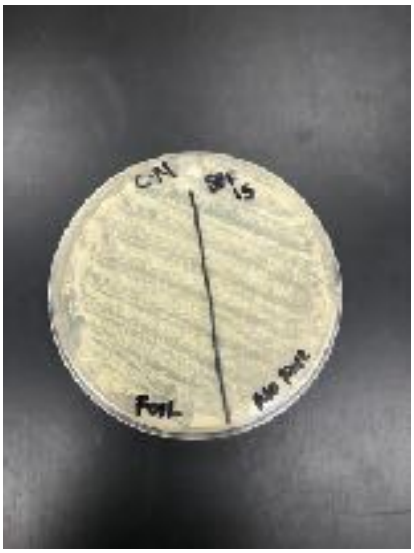
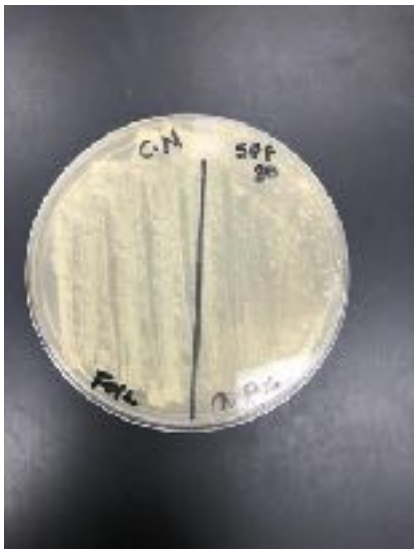


Fig 1: Graph of percentage of yeast survival after UV exposure due to treatment given



SPF 15



SPF 30

No SPF