



CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY

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<b>Project Title</b> <b>In Search of the Ideal Protection for Humans from Physiologic Burns:          Analysis of Ultraviolet Radiation Protective Agents</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b>          Skin cancer rates are continuing to rise in America and are primarily due to UV exposure. The purpose of this experiment is to determine the most effective skin protectant product for blocking ultraviolet (UV) radiation from the sun. Common bacteria from the mouth serve as a proxy for human skin as they have been shown to be damaged by UV radiation like human skin. Many commercial sunscreens, sunblocks, clothing items, and makeup are widely believed to be protective against sun exposure. There have been no comparisons reported of the relative effectiveness of these products. The hypothesis of this experiment was that different sun protectants would protect bacteria from UV radiation to different extents and that this would answer the research question identifying the most effective skin protectant.</p> <p><b>Methods/Materials</b>          Petri dishes with agar were inoculated with sun sensitive bacteria and allowed to grow for one week in the dark. A colony count was performed and one of the UV protectants was applied. The protected bacteria were then exposed to UV radiation and colony counts of the bacteria were made at three and seven days following UV exposure.</p> <p><b>Results</b>          This experiment found that sunblock containing zinc oxide performed the best with an increase in bacterial growth of 90% over seven days. The worst performing product was makeup with a 70% decrease in bacterial counts.</p> <p><b>Conclusions/Discussion</b>          Sun block with zinc oxide provided the greatest protection for the bacteria, though dry fabric also proved to be effective protection. Zinc Oxide and other agents described as sunblocks work by reflecting light rather than absorbing and altering it as sunscreens do. This project will benefit many people. Skin cancer continues to increase and is the most common cancer. This project has given better insight into which products will work the best for sun protection and is important information for everyone planning any sun exposure and for those people who provide recommendations for sun protection such as pediatricians and dermatologists. Extending this experiment to cultured human skin will confirm these findings and potentially reduce skin cancer rates.</p>	
<b>Summary Statement</b> This experiment demonstrated that methods of protection from UV radiation differed in their ability to protect bacteria exposed to UV rays from the sun, and that sun blocks were significantly superior to other products.	
<b>Help Received</b> Minimal, as I designed, built, and performed the experiments myself, though my father confirmed the bacterial counts as a blinded observer to confirm my findings.	