Testing the True Power of Sunscreens

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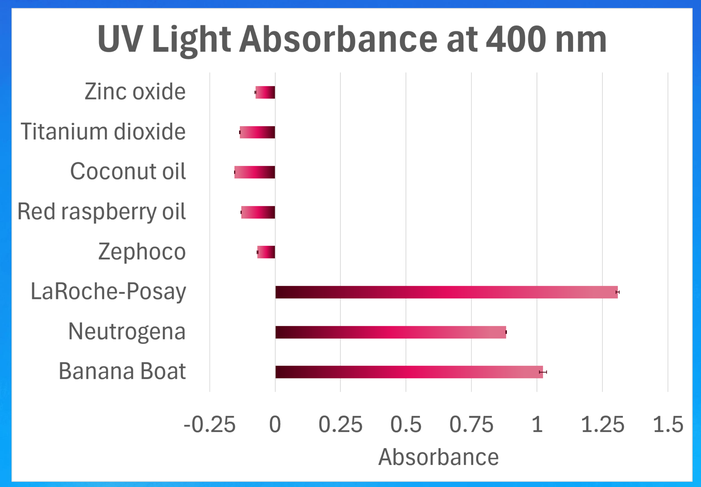
Introduction

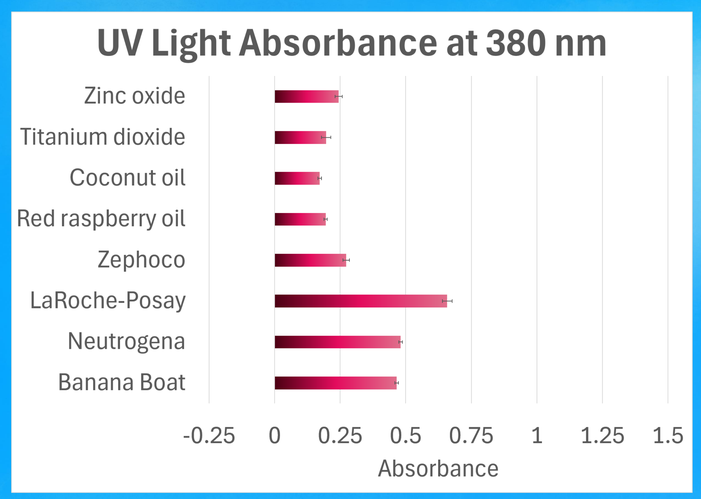
Skin cancer is the most common type of cancer, and 1 in 5 people in the United States will get skin cancer before the age of 70 (Rogers et al., 2015). This study compared the effectiveness against UV light of the top two commercial sunscreens in the United States, two dermatologist-recommended sunscreens, and the individual components common in sunscreens. Previous studies reported sunscreen components, including coconut oil and red raspberry seed oil, absorb UV light (Hussein and Dhahi 2026) but they have never been directly compared to contemporary sunscreens. The hypothesis is that there is a significant difference in the amount of light that travels through the different sunscreens used and that the components that will yield the highest amount of light absorbed will be the individual component, titanium dioxide, due to it being an essential sun blocker in sunscreen.



Materials and Methods

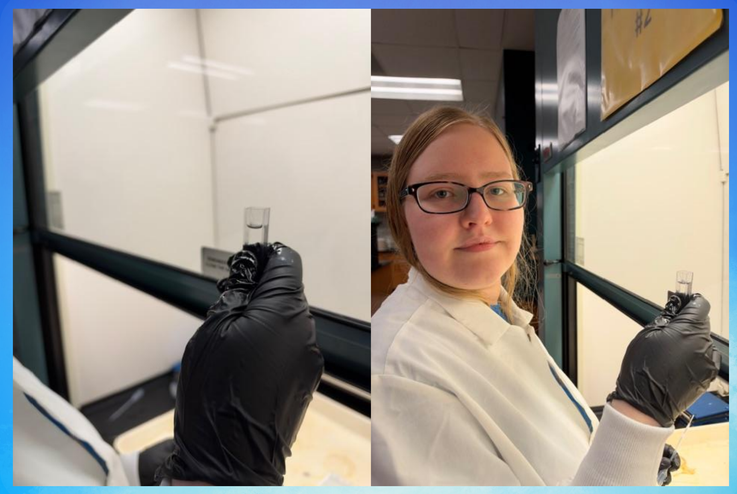
- Top selling commercial brands: Banana Boat Sport Ultra, Neutrogena Beach Defense
- Top dermatologist recommended brands: La Roche-Posay, Zephoco (powered sunscreen)
- Oil components: coconut oil, red raspberry seed oil
- Mineral filter components: titanium dioxide, zinc oxide
- Distilled water as the control group
- UV-VIS spectrophotometer
- Ethanol 95%





Results

- Spray and lotion sunscreens absorbed more UV light than the individual components and the powered sunscreen
- In higher UV spectrums the coconut oil, red raspberry seed oil, titanium dioxide, zinc oxide and powered sunscreen returned with negative values.
- LaRoche-Posay absorbed the most light and coconut oil absorbed the least light.



Discussion

The data shows that the alternative hypothesis is correct, there is a significant difference in the amount of light that travels through the different sunscreens. Oddly, the results also show that the individual components and powered sunscreen that were expected to perform well actually absorbed close to no light and were comparable to coconut oil, which is frequently used for sunbathing. This might be due to the powered sunscreen, zinc oxide, and titanium dioxide reflecting light rather than outright absorbing it. Notably, the red raspberry seed oil tested as having one of the lowest absorbency rates despite other studies finding it was high in SPF (Hussein & Dhahi, 2026). This research finds that it is the dermatologist recommended sunscreens that absorbed the most light and therefore did better than any other kind of sunscreen. Further research could be done using different kinds of spectrophotometers and equipment to further test light reflected by powered sunscreen and the components.

Acknowledgements

Elise Schwerer (Background Art)

Literature Cited

- Rogers, H. W., Weinstock, M. A., Harris, A. R., Hinckley, M. R., Feldman, S. R., Fleischer, A. B., & Coldiron, B. M. (2015). Incidence estimate of nonmelanoma skin cancer (keratinocyte carcinomas) in the US population, 2012. JAMA Dermatology, 151(10), 1081–1086. doi.org
- Kavitha, P., Prabu, H. G., & Rajendran, V. (2016). DNA binding and dispersion activities of titanium dioxide nanoparticles with UV/vis spectrophotometry, fluorescence spectroscopy and physicochemical analysis at physiological temperature. Journal of Molecular Liquids, 213, 129-137. https://doi.org/10.1016/j.molliq.2015.10.034
- Hussein, K. A., & Dhahi, R. M. (2026). Formulation of vegetable oils loaded nanoemulsions for photoprotection against UVB and UVA radiation: *In vitro* study. *Journal of Applied Sciences and Nanotechnology*, *6*(1), 12–26. https://doi.org/10.53293/2788-6867.1001