Development of a Non-Synthetic Filter to Protect Against Ultraviolet Radiation Induced Erythema: Dugesia tigrina as an in vivo Experimental Model on the Effects of Botanical Extracts as Radioprotective Substances

Luna, Isabelle (School: Sanger High School)

Globally, 2-3 million skin cancer cases arise annually. This project proposes that Ultraviolet radiation (UVR) can be reduced by the creation of a non-synthetic UVR filter, and epidermal afflictions can be treated by the use of organic remedies. In phase 1 a UV light was placed over a glass slide with a filter made from an applied base and selected botanical. Transmittance was gauged using UVAB and UVB radiometers. The UV protective abilities of the formulations were tested against a standard SPF 30 sunscreen in their reduction of present UVR. In phase 2 the regenerative abilities of only the purified extracts were tested with and without UV exposure. 0.1 mL of the extracts were added to 20 mL spring water and a bisect cut was made. This was repeated for each botanical and recorded using a caliper. The application of the extracts to the planarians was measured on days 1 and 10, done in replicants of 10, to determine changes in length. Results in phase 1 show that the turmeric filter, of the 6, had the most reduction in UV transmittance with 87.8% UVAR and 66.7% UVBR reduced, the SPF 30 had a reduction of 63% UVAR and 45% UVBR. All reduced over a 15-120 min duration (every 15 min). This indicates the turmeric filter was successful in UVR protection over the SPF 30. The results in phase 2 show that the turmeric botanical, of the 6, was the most effective in epidermal healing with overall growth of 2.4 mm after exposure to UVR and 3.49 mm unexposed, all within a 10 day trial. This indicates that turmeric improved epidermal healing. This project showed that the turmeric filter reduced the amount of UVR, and the turmeric botanical enhanced the healing of planarians. Ideally, this formulation will have the ability to perform both processes simultaneously on human subjects.