Development of a Novel Multi-Functional Non-Synthetic UV Filter to Prevent Erythema, Support Tissue Repair, and Minimize Environmental Toxicity

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Radiation exposure globally results in 2-3 million skin cancers annually. This project proposed an alternative non-synthetic, environmentally safe, multifunctional UV filter. Preliminary research resulted in a formulation consisting of an applied base and deliberately selected polyphenolic compounds. First, objectives measured the Experimental Multifunctional Filters' (EMF) ability to block UV light, secondly, to observe amputated planarians (Dugesia tigrina) for therapeutic benefits of healing damaged tissue, and lastly, its toxicity on aquatic environments using planarians. Initially turmeric, cork oak, and deodar cedar were extracted for testing. UV blockage of botanical solutions was investigated using a spectrophotometer to measure UV light transmission. Deodar cedar was most effective with 99% blocking at 320 nm. The EMF was then compared to SPF 30 sunscreens for UV blockage. The EMF compared well against SPF 30 in absorption of UVA and UVB at wavelengths ranging from 290 to 400 nm. Growth rates, as a measure of therapeutic benefits, were measured on amputated planarians exposed to UV light with EMF and control. Growth with EMF was 1.38mm longer after 7 days compared to control. Again, therapeutics were investigated by immersing amputated segments in botanicals after UV exposure. With botanicals, improved growth was seen at 1.24mm longer than initial length. EMF was less toxic with 0% mortality of immersed planarians compared to 30% mineral and 100% chemical sunscreens. Results support a successful alternative Experimental Multifunctional Filter (EMF) with comparative UV blocking, but advantaged therapeutic healing and improved environmental safety compared to commonly used UV protection.

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