Protective Effect of Bromelain and Pineapple Extracts on UV-Induced Damage in Human Skin Cell

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Bromelain is a potentially useful enzyme derived from pineapple plants that may protect cells from sun exposure. We tested whether bromelain sourced from pineapple waste could protect cells exposed to harmful UVB rays, making use of pineapple that would have been discarded. A bromelain stock solution and protein extracts of the crown, flesh, stem, and skin of the pineapple were prepared to treat skin cells for a sun exposure assay. For the pre-treatment method, skin cells were exposed to UVB light for 30 minutes after they were treated with 30 µg/mL of protein extracts. For the post-treatment method, skin cells were exposed to UVB light before they were treated. A cell viability assay was conducted on both the pre-treated and post-treated cells to determine the protective effect of bromelain on skin cells. Compared to the non-treated cells, both the pre-treated and post-treated cells showed a significant increase in cell viability ($p<0.0001$, one-way ANOVA). Finally, we analyzed TNF-a mRNA expression levels using RT-qPCR and gel electrophoresis to determine the level of inflammation of skin cells. Unexpectedly, bromelain solution and protein extracts increased TNF-a expression levels ($p<0.0012$, one-way ANOVA). This study showed that bromelain and protein extracts from the pineapple can protect skin cells against UVB light and increase TNF-a mRNA expression levels within the cells. Our results may offer a way to protect the skin from UV and repurpose pineapple waste. Further experiments will test the cytotoxicity of bromelain and determine levels of more pro-inflammatory genes.

Awards Won:
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $52,000 each)