**[**A review of the study: UV –B radiation induces the expression of antimicrobial peptides in human keratinocytes in vitro and in vivo**]**

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**[**The objective of the manuscript under review is to determine if UV radiation can induce antimicrobial peptides in vitro and in vivo. UV radiation from the sun leads to retinal damage and skin cancer. UV radiation can be synthesized and used in the medical field and laboratories in suppressing the immune system in order to combat autoimmune diseases or other problems such as psoriasis. It is still unclear the long term effects of UV radiation on a patient and how it alters their skin microbiome. It is a common misconception that UV radiation disturbs the epidermal barrier which naturally coincides with an increased risk of bacterial infections. Scientists have been speculating why the correlation of UV radiation and epidermal barrier does not lead to an increase in bacterial infections.**]**

**Introduction**

**[**The scientists and doctors of the Department of Dermatology and Allergology from the University of Kiel in Kiel, Germany discovered that antimicrobial peptides were somehow present after exposure to UV radiation [1]. The antimicrobial peptides protected the epidermal barrier from bacterial infection. They hypothesized that antimicrobial peptides were a product of UV radiation exposure. In order to determine the source of the antimicrobial peptides they had to test their theory by using human keratinocytes in vitro and human skin cells in vivo from clinical volunteers. They exposed the cells to UV radiation over a course of three days and used PCR and fluorescent-activated cell sorting to measure the expression of antimicrobial peptides. They determined that UV radiation suppresses adaptive immunity but conversely, induces innate immunity. UV radiation inhibits cellular immune reactions [2]. It does this by inducing antigen-specific tolerance through regulatory T cells. According to Schwarz, UVB radiation suppresses the immune system by inhibiting antigen presentation, releasing cytokines, and causing apoptosis of leukocytes [3]. This is a possible explanation as to why T-cell mediated immune reactions can be suppressed by UV exposure. UV radiation has proven to induce antigen-specific tolerance via regulatory T-cells [1]. This means that UV radiation does not compromise the immune system in the same manner as other immunosuppressive drugs do. It is not completely understood how this works in vivo. The adaptive immune system can be harmful to the host’s epidermis when mediated by T-cells because the T-cells will attack the host’s healthy cells. On the reverse, the innate immune response activates components such as neutrophils, eosinophils, natural killer cells, mast cells, cytokines, complement, and antimicrobial peptides and proteins.**]**

**Recent Progress**

**[**The human epidermis is now known to secrete antimicrobial peptides such as beta-defensins. Beta-defensins have been found on the site of lesional skin [4]. They also secrete antimicrobial peptides that attack gram negative bacteria [4]. These antimicrobial peptides are recognized to be a key component in the bacterial defense of the epidermis. This study is important in identifying the correlation between UV radiation and antimicrobial peptides. This knowledge can be applied to the medical field as well as further research to treat T-lymphocytic disorders through UV radiation. This study is important because it has helped scientists to understand the short-term effects of UV radiation therapy and its antimicrobial effects. A limitation of the study is that data was collected only on mRNA. The authors of the study suggested that data on the proteins involved in this process and their changes should have been monitored to understand more about this topic. This study was the first to have quantifiable evidence that UV radiation does lead to keratinocyte-derived antimicrobial peptides.**]**

**Discussion**

**[**The experiment performed by the authors should be replicated on a larger scale. They used six volunteers for their in vivo samples. They used a small number because the experiment required a skin biopsy and it would have been difficult to perform that on a larger scale. Nevertheless, the in vitro cells could be taken to a larger scale. A complex analysis of proteins involved in UV radiation and its immune effects could further contribute to new discoveries on this process and could lead to a better understanding of how UV radiation therapy is beneficial or harmful to a patient. This experiment is valid and was performed ethically. The results address the asked questions concerning the relationship between UV radiation and antimicrobial peptides.**]**

**References**

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