The Mechanism of Pitera as a Suppressor of Oxidative Stress

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Introduction: Vitiligo is a pigment disorder that results in the destruction of melanocytes. Although it is essentially a cosmetic disease, it can be mentally and emotionally debilitating. There are currently no treatments that can conclusively provide reversal of depigmentation or prevention of further depigmentation. One of the components to vitiligo is increased susceptibility to oxidative damage, which results in melanocyte apoptosis. A new treatment, called Pitera, is on the horizon that targets this aspect of the disease. Pitera is a proven antioxidant in human skin models (Hakozaki 2007). However, the exact antioxidant mechanism of Pitera has still to be uncovered.

Methods: By inducing oxidative damage in human melanocytes by treatment with 4-tertiary butyl phenol (a known inducer of contact vitiligo) and selectively inhibiting transcription or translation by treatment with actinomycin D or cyclohexamide, we sought to determine if Pitera's antioxidant mechanism is direct or indirect. If the mechanism is indirect then Pitera influences upregulation of genes encoding endogenous antioxidants via transcription or translation. If the mechanism is direct then Pitera neutralizes the reactive oxygen species (ROS) in a fashion similar to the well-known enzyme catalase. Furthermore, we tested its direct antioxidant effect by comparison with catalase using a specified antioxidant assay kit. On the contrary, under the possibility that the mechanism is indirect, we performed a western blot to see if Pitera upregulates catalase.

Results: Although there were no clear outcomes regarding Pitera's mechanism, there was evidence pointing towards a direct mechanism, as seen by Pitera's ability to reduce the level of ROS after treatment with 4-TBP opposed to treatment with Pitera before 4-TBP. After assessing the western blot, it is clear that Pitera does not upregulate levels of endogenous catalase. Finally, its antioxidant activity was not comparable to catalase. However, this does not rule out the potential for a direct mechanism and could entail that Pitera works by a different type of direct mechanism not assessed by the kit we used.

Conclusion: There are no known pathways for Pitera's antioxidant mechanism. However, there is more evidence for a direct pathway, rather than an indirect pathway. Further investigation needs to be performed. Uncovering the mechanism of Pitera contributes to further use of Pitera for treatment of pigment disorders including vitiligo.

References:

Hakozaki T, Date A, Yoshii T, Toyokuni S, Yasui H, Sakurai H. Visualization and characterization of UVB-induced reactive oxygen species in a human skin equivalent model. Arch Dermatol Res Suppl 1: S5-6, 2007.

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