Basic evidence for epidermal H$_2$O$_2$/ONOO$^-$-mediated oxidation/nitration in segmental vitiligo is supported by repigmentation of skin and eyelashes after reduction of epidermal H$_2$O$_2$ with topical NB-UVB-activated pseudocatalase PC-KUS.

Schallreuter KU, Salem MA, Holtz S, Panske A.

Source

*Institute for Pigmentary Disorders, E. M. Arndt University, Greifswald, Germany; and.

Abstract

Nonsegmental vitiligo (NSV) is characterized by loss of inherited skin color. The cause of the disease is still unknown despite accumulating in vivo and in vitro evidence of massive epidermal oxidative stress via H$_2$O$_2$ and peroxynitrite (ONOO$^-$) in affected individuals. The most favored hypothesis is based on autoimmune mechanisms. Strictly segmental vitiligo (SSV) with dermatomal distribution is a rare entity, often associated with stable outcome. Recently, it was documented that this form can be associated with NSV (mixed vitiligo). We here asked the question whether ROS and possibly ONOO$^-$ could be players in the pathogenesis of SSV. Our in situ results demonstrate for the first time epidermal biopterin accumulation together with significantly decreased epidermal catalase, thioredoxin/thioredoxin reductase, and MSRA/MSRB expression. Moreover, we show epidermal ONOO$^-$ accumulation. In vivo FT-Raman spectroscopy reveals the presence of H$_2$O$_2$, methionine sulfoxide, and tryptophan metabolites; i.e., N-formylkynurenine and kynurenine, implying Fenton chemistry in the cascade (n=10). Validation of the basic data stems from successful repigmentation of skin and eyelashes in affected individuals, regardless of SSV or segmental vitiligo in association with NSV after reduction of epidermal H$_2$O$_2$ (n=5). Taken together, our contribution strongly supports H$_2$O$_2$/ONOO$^-$-mediated stress in the pathogenesis of SSV. Our findings offer new treatment intervention for lost skin and hair color.-Schallreuter, K. U., Salem, M. A. E. L., Holtz, S., Panske, A. Basic evidence for epidermal H$_2$O$_2$/ONOO$^-$-mediated oxidation/nitration in segmental vitiligo is supported by repigmentation of skin and eyelashes after reduction of epidermal H$_2$O$_2$ with topical NB-UVB-activated pseudocatalase PC-KUS.