Basic evidence for epidermal H2O2/ONOO--mediated oxidation/nitration in segmental vitiligo is supported by repigmentation of skin and eyelashes after reduction of epidermal H2O2 with topical NB-UVB-activated pseudocatalase PC-KUS.

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Source

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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_2O_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/thioreoxin reductase, and MSRA/MSRB expression. Moreover, we show epidermal $ONOO^-$ accumulation. In vivo FT-Raman spectroscopy reveals the presence of H_2O_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_2O_2 (n=5). Taken together, our contribution strongly supports H_2O_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_2O_2/$ONOO^-$-mediated oxidation/nitration in segmental vitiligo is supported by repigmentation of skin and eyelashes after reduction of epidermal H_2O_2 with topical NB-UVB-activated pseudocatalase PC-KUS.