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Topical ozone therapies improve atopic dermatitis via rapidly reducing *S. aureus* colonization and immunoregulation

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Background: Atopic dermatitis (AD) is an inflammatory skin disease characterized as *Staphylococcus aureus (S. aureus)* colonization as well as an imbalanced immune response. Current research shows that topical ozone therapy is an effective and alternative treatment in the management of multiple skin diseases, including AD. However, the mechanism for the ozone is not clearly understood.

Methods: Patients between 6–65 years old diagnosed with moderate or severe AD were treated topically with ozone. The treatment scheme is topical application of ozonated water followed by ozonated oil, twice daily, for two weeks. The Severity Scoring for AD (SCORAD) index, Visual Analog Scale (VAS) pruritus and sleep scores were evaluated. The thickness of epidermal layer was detected by Reflectance Confocal Microscopy (RCM) and the expression of Th1, Th2, Th17 and Treg type cytokines in peripheral blood was tested by ELISA. Plate cultivation was used to quantitatively detect numbers of *S. aureus* colonizations in skin lesions.

Results: Twelve patients in the present study showed significant improvement in the eczematous skin lesions, with better keratinization of the stratum corneum, clearer basal layer structure and reduced infiltration. of inflammatory cells SCORAD, VAS pruritus and sleep scores were all significantly decreased ($p<0.01$). The ozone decreased the numbers of *S. aureus* colonization in skin lesions after treatment (90.74±0.14) % ($P< 0.01$). By using ELISA, we detected several cytokines concentrations in the serum in the patients. It was found that IL-17A expression was significantly decreased after treatment with ozone ($p<0.01$). On the other hand, although ozone increased the level of suppressive cytokine, IL-10, and decreased the level of pruritus related cytokine, IL-31, no significances were found ($p>0.05$).

Conclusion: The treatment by using topical ozone alone significantly improves eczematous lesions in patients with AD. The mechanisms involved might be related to rapid reduction of *S. aureus* colonization and decreasing IL-17A expression. Our findings suggest that topical ozone therapy may be a potential remedy for AD.

Recent Publications:

1. Lu J, Chen M, Gao L, Cheng Q, Xiang Y, et al. (2018) A preliminary study on topical ozonated oil in the therapeutic management of atopic dermatitis in murine. J Dermatolog Treat. 22:1–21.
2. Zeng J and Lu J (2018) Mechanisms of action involved in ozone-therapy in skin diseases. Int Immunopharmacol. 56:235–241.
3. Lu J, Li M, Huang J, Gao L, Pan Y, et al. (2018) Effect of ozone on Staphylococcus aureus colonization in patients with atopic dermatitis. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 43(2):157–162.
4. Lu J, Wu K, Zeng Q, Xiang Y, Gao L, et al. (2018) Serum interleukin-31 level and pruritus in atopic dermatitis: A meta-analysis. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 43(2):124–130.
5. Huang J, Huang J, Xiang Y, Gao L, Pan Y, et al. (2018) Topical ozone therapy: An innovative solution to patients with herpes zoster. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 43(2):168–172.

Biography

Jianyun Lu is the Professor and Chair of the Department of Dermatology, The Third Xiangya Hospital of Central South University, and Visiting Scholar of Dermatology of Northwestern University. She is also the Standing Committee Member of the Branch of Dermatology and Immunology of China Association of Chinese Medicine. Her main research interests include the pathogenesis of atopic dermatitis and its intervention; study on clinical application and mechanism of medical ozone and Cosmetic Dermatology.

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