

# Low-temperature atmospheric plasma increases the expression of antiaging genes of skin cells without causing cellular damages

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Efforts to employ various types of plasma in the field of skin care have increased consistently because it can regulate many biochemical reactions that are normally unaffected by light-based therapy [1]. One method for skin rejuvenation adopted a high-temperature plasma generator to remove skin epithelial cells [2]. In this case, the catalyzing effects of the plasma were rarely used due to the high temperature. Hence, the benefits of the plasma were not magnified. Recently, many types of low-temperature plasma devices have been developed for medical applications but their detailed functions and working mechanisms are unclear [3].

The present study examined the effect of low-temperature microwave plasma on skin cells. Treatment with low-temperature plasma increased the expression of anti-aging genes in skin cells, including collagen, fibronectin and vascular endothelial growth factor A (VEGF-A). Furthermore, the plasma treatment did not cause cell death, but only induced slight cell growth arrest at the G2 phase. Although the cells treated with low-temperature plasma showed moderate growth arrest, there were no signs of thermal or genetic damage of skin cells. We also tested the possible role of the plasma on skin barrier function. The cells treated with plasma showed decreased expression of E-cadherin and lack of cell-to-cell interactions. The plasma treatment to mouse skin did not cause tissue damage, but increased penetration of hydrophilic substances into the skin. Overall, this low-temperature microwave plasma device could be useful for the wound healing and the absorption of drugs or cosmetics.

## References

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