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QUADESSY

Recent Advances in the Treatment of Enlarged Pores and Sebaceous Glands Using Double-needle Microneedle RF

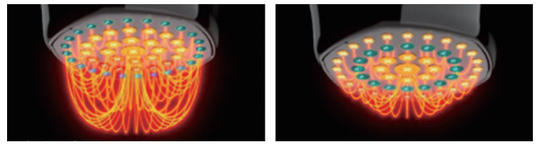


Improvement of enlarged pores and excessive sebum production is one of the most common demands in aesthetic medicine, yet it remains one of the most challenging areas in which to achieve consistently satisfactory outcomes. Traditionally, the size and activity of the sebaceous glands were considered major contributors to enlarged pores, and treatment strategies therefore evolved primarily around the selective destruction of sebaceous glands. However, with advances in our understanding of skin aging and tissue biology, enlarged pores are now increasingly viewed not simply as a sebaceous gland problem, but as the result of complex interactions involving changes in the basement membrane, senescent fibroblasts, and the extracellular matrix. RF microneedling is at the forefront of this evolving treatment concept. In particular, the recently introduced double-needle RF microneedling technology, which enables simultaneous targeting of different skin layers, is advancing the conventional approach to pore treatment to a new level.

A New Understanding of Enlarged Pores

Pore size is not determined solely by the amount of sebum production. In clinical practice, we often encounter cases in which pores do not decrease is not determined solely by the amount of sebum production. In clinical practice, we often encounter cases in which pores do not decrease sufficiently despite a reduction in sebum secretion. Recent studies have suggested that multiple factors contribute to pore enlargement, including sebaceous gland hypertrophy, follicular dilation, dermal elastosis, basement membrane degeneration, and the accumulation of senescent fibroblasts. In particular, ultraviolet exposure and chronic inflammation promote the accumulation of senescent fibroblasts within the dermis. These cells interfere with normal collagen regeneration and secrete pro-inflammatory cytokines, thereby contributing to deterioration of the skin structure. Therefore, modern pore treatment should go beyond simple destruction of the sebaceous glands and be approached from the broader perspective of dermal rejuvenation. RF microneedling induces collagen regeneration and tissue remodeling by creating direct thermal coagulation zones within the skin. Hantash et al. reported the formation of fractional radiofrequency treatment zones (FRTZs), and subsequent studies have demonstrated the efficacy of RF microneedling in skin rejuvenation and scar improvement.

More recently, the indications for RF microneedling have expanded considerably to include enlarged pores, acne scars, rosacea, melasma, skin laxity, and drug delivery. This is particularly relevant for Asian skin, as RF microneedling enables selective treatment of the dermis while minimizing epidermal damage.



QUADESSY's Wavplus allows adjustment of the thermal energy delivery layer according to the target depth through Deep mode and Low mode. Courtesy of CLASSYS.

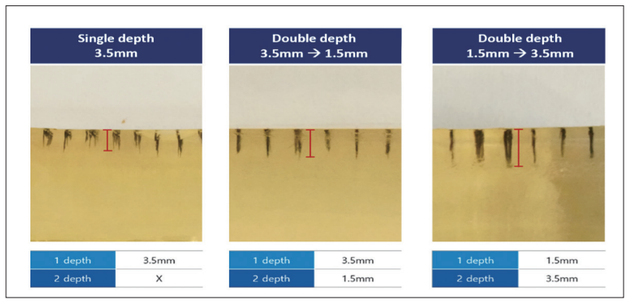
Why Is Double-Depth Treatment Necessary?

Conventional RF microneedling is largely based on single-depth treatment. However, skin aging does not occur within a single layer of theskin. The papillary dermis plays an important role in basement membrane integrity and melanin regulation, whereas the reticular dermis is closely associated with sebaceous glands, pores, scars, skin elasticity, and tissue density. Therefore, treating both layers simultaneously may provide a broader tissue-regenerative effect. Recently, double-needle RF microneedling technology has been regarded as a platform that clinically implements this concept.

The Evolution of RF Microneedling: From Basement Membrane Regeneration to Drug Delivery

The paradigm of skin-aging treatment has recently evolved beyond simply targeting the epidermis and dermis toward restoration of the basement membrane that connects these two layers, as well as toward multimodal combination treatments. The basement membrane, located at the dermoepidermal junction (DEJ) between the epidermis and dermis, is a key structure involved in nutrient supply, cell signaling, and the regulation of melanin transfer. With aging, the basement membrane becomes disrupted and irregular, contributing to hyperpigmentation and deterioration of skin texture. Recently, shallow-depth RF microneedling has gained attention as a treatment approach that promotes basement membrane regeneration and provides overall improvement in skin quality beyond the conventional treatment of enlarged pores and scars.

Advances in clinical protocols aimed at maximizing treatment efficiency have also been notable. A representative approach involves pre-heating the



Comparison of single depth and double depth RF delivery with QUADESSY. Courtesy of CLASSYS.

entire dermis with bipolar RF before needle penetration. Pre-heating the tissue lowers impedance and increases electrical conductivity, allowing for the formation of more uniform and stable thermal treatment zones during needle insertion. This not only enhances treatment efficacy but may also help reduce patient discomfort.

Furthermore, RF microneedling is expanding beyond physical and thermal tissue regeneration into a drug delivery platform that facilitates the penetration of active agents into the dermis. Through microchannels created by the needles, this approach can enhance the delivery of regenerative substances such as exosomes and PDRN, as well as PLLA, PDLLA, and PCL. Hybrid treatments that combine the intrinsic tissue-regenerative effects of RF microneedling with the biological activity of these agents are expected to become a key trend in the future of aesthetic medicine.

Clinical Study Data and Conclusions

According to a recent clinical study using QUADESSY, pore area decreased by an average of approximately 30 - 40% following RF microneedling treatment, with a significant reduction in sebum production as well. Histologically, neocollagenesis and reorganization of elastic fibers were observed. In the latest platforms incorporating a double-needle design, drug penetration efficiency has been reported to improve by approximately 67% compared with conventional methods, suggesting promising potential for RF-based drug delivery systems. The treatment of enlarged pores and sebaceous glands is no longer focused simply on destroying the sebaceous glands. More recent approaches have evolved to simultaneously address dermal regeneration, basement membrane restoration, elimination of senescent cells, and tissue remodeling. Double-needle RF microneedling technology is significant as a platform capable of translating these emerging concepts into clinical practice. In particular, it demonstrates broad potential applications in the treatment of enlarged pores, sebaceous glands, facial erythema, pigmentation, and skin aging. In the future, RF microneedling is expected to evolve beyond a simple energy-based device into a comprehensive skin rejuvenation platform.



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