

CLASSYS

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The Evolution of VOLNEWMER MonopolarRF : From Power-Centric Approaches to Precision Thermal Control



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Exploring the Potential of Next-Generation Monopolar RF

Over the past two decades, monopolar radiofrequency (RF) has established itself as one of the core energy-based device (EBD) for skin lifting, tightening, and rejuvenation, with the original monopolar RF system serving as the long-standing benchmark in the field. Recently, however, the paradigm of monopolar RF has shifted beyond simply delivering higher output toward achieving more precise thermal distribution control and greater tissue selectivity. In a recent prospective, randomized, split-face, single-blinded clinical study published in *Annals of Dermatology*, in which the author participated as an investigator, the Radiofrequency with Continuous Water Cooling (RF-CWC) technology of VOLNEWMER was directly compared with the Radiofrequency with Cryogen

Spray Cooling (RF-CSC) technology employed by the original monopolar RF device.

More Than a Less Painful RF Technology

In this 8-week study involving 22 Asian women, both devices demonstrated overall non-inferiority in lifting, tightening, and wrinkle reduction when treated under identical conditions (300 shots, 65 W, approximately 65 J per shot). However, notable differences emerged in pain perception and superficial skin texture. RF-CWC produced significantly lower visual analogue scale (VAS) pain scores than RF-CSC throughout treatment, including after 100, 200, and 300 shots. At 300 shots, the mean VAS score was nearly half that of RF-CSC (4.5 vs. 8.4, $p < 0.05$).

In addition, RF-CWC demonstrated significantly greater improvements in skin density (Week 8, $p < 0.05$) and pore size (all evaluation time points, $p < 0.05$). These findings suggest that the clinical differences cannot be explained by pain reduction alone, but may instead reflect fundamentally different patterns of tissue response resulting from the mode of thermal delivery. Traditionally, the primary role of cooling in monopolar RF has been to protect the epidermis.

However, the rapid cooling achieved with cryogen spray may, under certain conditions, extend beyond the epidermis and inadvertently cool the papillary dermis, potentially reducing the efficiency of superficial dermal remodeling.

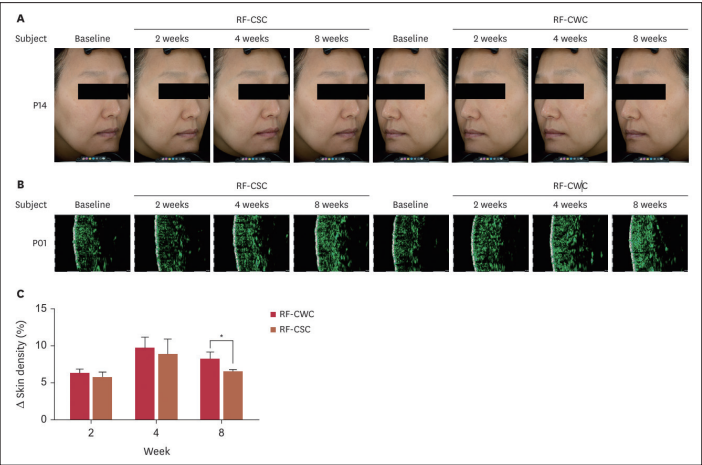
In contrast, continuous water cooling maintains a stable cooling interface throughout treatment, creating a more consistent thermal gradient. This approach may preserve epidermal protection while enabling more uniform heat distribution across the papillary-reticular dermal interface. These thermal characteristics may explain the dual-layer activation associated with RF-CWC, accounting for its ability to improve not only lifting and tightening but also pore size and fine wrinkles.

The Evolution Toward Texture Enhancement and Regeneration

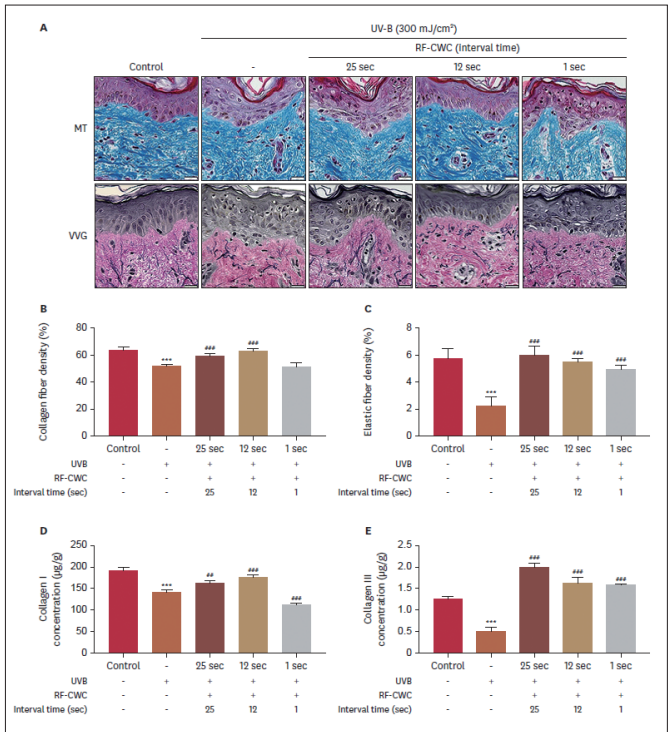
In the ex vivo UVB-induced photoaging skin model, RF-CWC increased the expression of collagen types I and III, restored elastin fiber density, and optimized dermal thermal accumulation when appropriate shot intervals were applied. Notably, collagen type III, a key master of early regenerative remodeling, suggests that RF-

Timepoint(Shots)	RF-CWC(VOLNEWMER)	RF-CSC
100shots	Significantly Lower	Reference
200shots	Significantly Lower	Reference
300shots	4.5	8.4

Comparison of VAS Pain Scores During Treatment (10-point scale). $p < 0.05$ for all intervals (RF-CWC vs RF-CSC).



Comparative improvements in skin density after RF-CWC and RF-CSC. Pre and post-treatment clinical photographs (split-face, week 8). Source : Comparative Analysis on the Efficacy of Monopolar Radiofrequency With Continuous Water Cooling and Conventional Cryogen Spray Cooling in Facial Rejuvenation, Hyojin Roh, Young In Lee, Sang Gyu Lee, Jewan Kaiser Hwang, Jinyoung Jung, and Ju Hee Lee, *Ann Dermatol*. 2025 Dec;37(6):397-407. English. <https://doi.org/10.5021/ad.25.166>.



Comparative results in a UV-B-exposed skin aged model ex vivo study after RF-CWC and monopolar radiofrequency with cryogen spray cooling. UV-B Aged skin ex vivo model — collagen•elastin fiber density and collagen I•III ELISA. Source : Comparative Analysis on the Efficacy of Monopolar Radiofrequency With Continuous Water Cooling and Conventional Cryogen Spray Cooling in Facial Rejuvenation, Hyojin Roh, Young In Lee, Sang Gyu Lee, Jewan Kaiser Hwang, Jinyoung Jung, and Ju Hee Lee, *Ann Dermatol.* 2025 Dec;37(6):397-407. English. <https://doi.org/10.5021/ad.25.166>.

CWC may promote a regenerative dermal response rather than merely inducing a coagulative effect. These findings suggest that the biological effects of monopolar RF are determined not simply by bulk heating, but by the interplay among energy delivery, shot interval, cooling, and heat diffusion. More importantly,

the future of monopolar RF lies not in generating greater heat, but in achieving precise thermal control capable of eliciting predictable tissue responses.

This study demonstrates the evolution of monopolar RF from high-power devices to precision-controlled technologies. The integrated design of VOLNEWMER evaluated in this study, which incorporates the cooling system, energy delivery, and tissue response, highlights the potential evolution of monopolar RF beyond a simple heating device toward a more precision-driven thermal control platform.

For next generation monopolar RF, the key will no longer be simply increasing treatment intensity, but rather achieving precise modulation of tissue responses while overcoming the traditional trade-off between pain and efficacy.

Reference

1 Roh H, et al. Comparative Analysis on the Efficacy of Monopolar Radiofrequency With Continuous Water Cooling and Conventional Cryogen Spray Cooling in Facial Rejuvenation. *Ann Dermatol.* 2025;37(6):397-407. DOI: 10.5021/ad.25.166.