CLASSYS

QUADESSY

Differentiated Pore Treatment Using Hybrid RF Technology



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Enlarged Pores: A Major Skin Concern

As the skin ages, it loses elasticity, begins to sag, and develops more wrinkles. Skin texture and tone become rougher and duller, pigmentary lesions increase, and pores in particular tend to become larger and more elongated. The surface area of a typical pore is approximately 0.1–0.6 mm^2, while enlarged pores generally refer to pores measuring approximately 0.3–0.6 mm^2. Intrinsic factors contributing to enlarged pores include genetic predisposition, increased sebum production, and age-related reductions in collagen and and elastin, while an important extrinsic factor is photoaging caused by ultraviolet exposure. Recently, enlarged pores are sometimes described online as “vertical pores.” As skin ages and loses elasticity, pores may gradually assume a more oblique shape and merge visually with wrinkle lines, causing originally round pores to appear more elongated.

According to the 2024 Opensurvey Beauty Trend Report, people in their 20s and 30s represented the largest age group visiting clinics for pore treatment (<Figure 1>). Among indications treated with microneedle radiofrequency (MNRF), enlarged pores accounted for 30%, scars for 21%, and acne for 20% (<Figure 2>). Patients often report disliking enlarged pores because they make the skin appear rough and uneven, are associated with excessive sebum and shine, and can interfere with smooth makeup application. The number of visible pores gradually increases through the 40s, then begins to decrease from the 50s as pores become more vertically elongated. By the 60s, many pores become less distinct as they blend into wrinkle lines. Pores are generally most prominent in the T-zone, including the forehead, nose, anterior cheek area, and chin, and become less prominent toward the lateral face. Effective treatment of enlarged pores generally requires addressing two key factors: reducing sebum production and restoring skin elasticity. Various treatment options have been used to reduce sebum production, including isotretinoin, oral contraceptives, 2% niacinamide, salicylic acid peels, ALA-PDT, Gold PTT, and carbohydrate restriction. Treatments aimed at simultaneously improving skin elasticity and reducing sebum production include fractional lasers, botulinum toxin, needle RF, and MNRF. Among these, MNRF is considered one of the most effective standalone procedures for pore treatment. The needles of MNRF penetrate to the level of the sebaceous glands, where they can induce sebaceous gland destruction while also promoting regeneration of the extracellular matrix (ECM) surrounding the pores to restore tissue elasticity. For visible pore improvement, the diameter of the infundibulum (<Figure 3>) must be reduced. Understanding the anatomy of the hair follicle is therefore essential. The major anatomical structures of the hair follicle include the infundibulum, sebaceous

Age Distribution of Patients Visiting the Clinic

10s	20s	30s	40s	50s
Skin concerns Acne, pimples		**Pores** Blackheads, enlarged pores, etc.	**Wrinkles** Crow’s feet, forehead lines, nasolabial folds, etc.	**Wrinkles** Crow’s feet, forehead lines, nasolabial folds, etc.
Skin color/tone Dark circles, uneven skin tone, etc.	**Pores** Blackheads, enlarged pores, etc.	**Dryness** Surface/deep skin dryness, flaking, etc.	**Pigmentation** Melasma, dark spots, freckles, etc.	**Pigmentation** Melasma, dark spots, freckles, etc.
			Loss of skin elasticity	**Loss of skin elasticity**

Figure 1. 2024 OpenSurvey Beauty Trend Report. Reasons for visiting aesthetic medical clinics by age group.

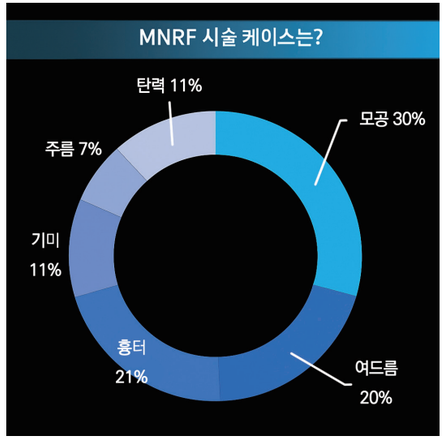


Figure 2. Microneedle RF treatment cases.

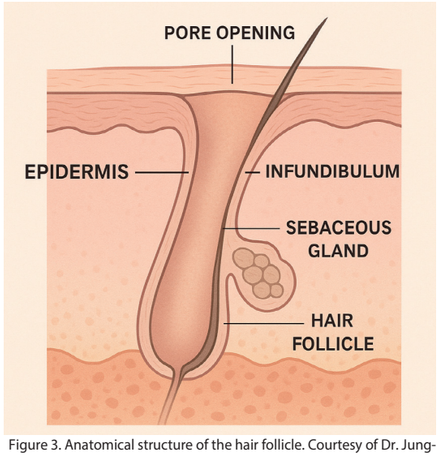


Figure 3. Anatomical structure of the hair follicle. Courtesy of Dr. Jung-Hyun Yoon.

gland, hair bulb, hair papilla, and hair shaft. The pore refers to the opening of the hair follicle. The infundibulum extends from the follicular opening to the sebaceous gland and has a funnel-shaped structure, with a wider opening of approximately 200–500 μm that gradually narrows toward the sebaceous gland to approximately 50–100 μm. Although there is individual variation, the infundibulum is typically located at a depth of approximately 200–500 μm, while the sebaceous glands are generally located at a depth of approximately 400–1,000 μm. Accordingly, MNRF treatment should target at least two distinct tissue depths.

Technology That Creates Differentiation

From hear, we will discuss the key features and operating principles of QUADESSY, as well as its effects in pore treatment.

Hybrid RF

QUADESSY uses a hybrid RF approach with the Deeplus tip (<Figure 4>), which combines MNRF with non-invasive bipolar RF. This technology is designed to treat enlarged pores, scars, wrinkles, facial redness, and melasma while also improving skin elasticity.

In the hybrid RF mode, 2 MHz non-invasive bipolar RF is delivered alternately through Channel 1 and Channel 2, followed by insertion of the centrally positioned MNRF needles into the skin, where 2 MHz bipolar RF is then delivered invasively (<Figure 5>).

A key advantage of this sequence is that non-invasive bipolar RF is delivered first. This produces bulk heating from the epidermis to the dermis, increasing tissue temperature and enhancing the electrical conductivity of skin tissue. As a result, the RF current subsequently delivered through MNRF can be conducted more effectively, allowing clinically meaningful effects to be achieved even at lower energy settings than would otherwise be required.

Because similar treatment outcomes may be achieved with lower energy than those used in other procedures, treatment-related pain may also be reduced. The initial warming effect can further contribute to improved treatment comfort. Even when equivalent or slightly higher energy is used to achieve better outcomes than conventional MNRF, pain does not necessarily increase substantially.

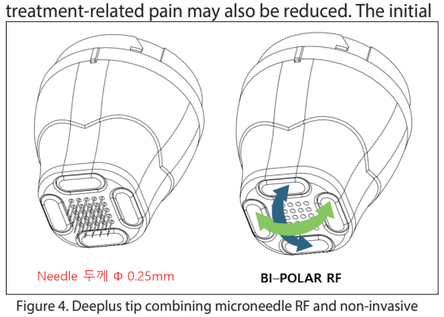


Figure 4. Deeplus tip combining microneedle RF and non-invasive bipolar RF. Courtesy of CLASSYS.

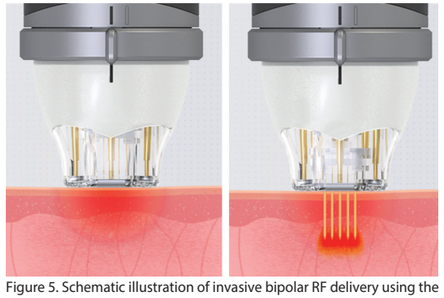


Figure 5. Schematic illustration of invasive bipolar RF delivery using the Deeplus tip through non-invasive bipolar RF and microneedle RF. Courtesy of CLASSYS.

Energy Cruise Control

Another key feature of QUADESSY is its use of Energy Cruise Control (ECC), a novel constant-power delivery system. In direct current circuits, the relationship among power(W), voltage(V), and current(I) is expressed as W = V × I, while Ohm's law describes the relationship as V = I × R(Resistance).

Conventional MNRF systems are typically designed to operate with constant current. As RF current encounters higher tissue resistance, voltage increases accordingly, which can lead to an increase in delivered power. Therefore, even when the same wattage is initially set, areas with higher resistance may experience an

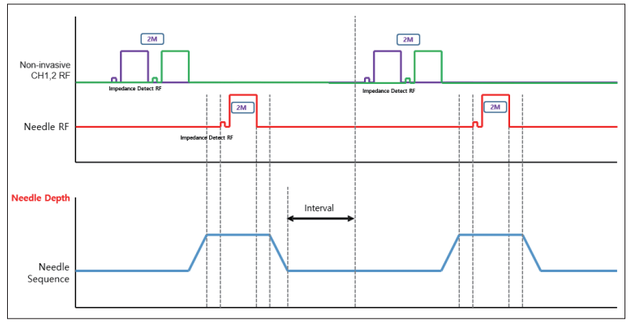


Figure 6. Real-time impedance matching. Courtesy of CLASSYS.

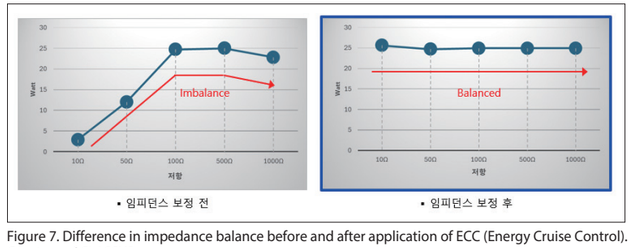


Figure 7. Difference in impedance balance before and after application of ECC (Energy Cruise Control). Courtesy of CLASSYS.

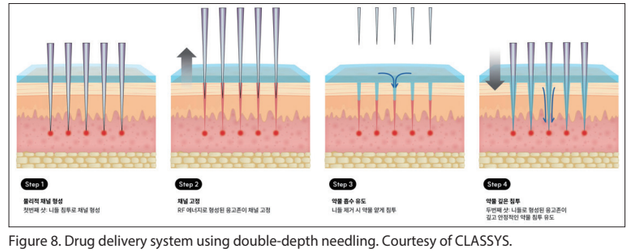


Figure 8. Drug delivery system using double-depth needling. Courtesy of CLASSYS.

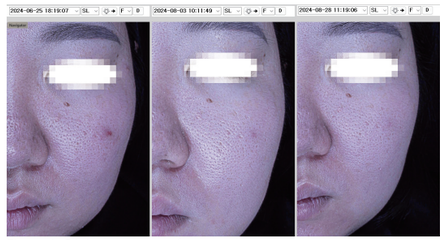


Figure 9. Clinical outcome of enlarged pore treatment using QUADESSY. Courtesy of Dr. Jung-Hyun Yoon.

unintended rise in voltage and power output, potentially increasing the risk of adverse effects such as burns or crust formation.

QUADESSY, equipped with ECC, uses a constant-power delivery method. Through real-time impedance matching, changes in tissue resistance are detected and the voltage is automatically adjusted so that the preset power is consistently delivered to the tissue. This allows the intended energy to be delivered accurately regardless of changes in resistance, while helping to prevent adverse effects caused by sudden increases in energy output (<Figures 6 and 7>).

Double Depth Needling

Double depth needling is a technique in which needling is performed twice at the same treatment site using two different depths. For pore treatment, the first needling targets the infundibular layer, while the second targets the sebaceous gland. By treating these two key anatomical targets within the same session, the therapeutic effect on enlarged pores can be enhanced.

When skin boosters such as PDLLA or PDRN are applied during double-depth treatment, the product can first penetrate through the channels created by the shallower needling, followed by additional penetration into deeper tissue through the second, deeper needling step (<Figure 8>).

When comparing MNRF alone, single-depth MNRF combined with non-invasive bipolar RF, and double-depth MNRF combined with non-invasive bipolar RF, all three approaches showed treatment effects. However, the combination of double-depth MNRF and non-invasive bipolar RF produced the most pronounced improvement on skin analysis imaging (<Figure 9>). Patient satisfaction was also highest with this approach.

A wide variety of MNRF devices and treatment techniques are now available, each with distinct features. Among them, QUADESSY combines hybrid RF using MNRF and non-invasive bipolar RF, ECC as a novel constant-power system for real-time impedance matching, and the concept of double-depth needling. Together, these technologies expand the versatility of RF treatment and may contribute to safer procedures and higher patient satisfaction.