

HIFU for Enhanced Transepidermal Delivery

By Kevin A. Wilson, Contributing Editor

High intensity focused ultrasound (HIFU) has been used for decades in aesthetic medicine as a nonsurgical tool to tighten and lift facial skin. Cavitation-induced thermal response in tissue causes collagen remodeling for skin tightening and may also improve the underlying superficial muscular aponeurotic system (SMAS) to restore a natural lift to the face over time. The same technology can also cause fat cell disruption and be used for both body shaping and skin tightening in the treatment area. Recent research also suggests that HIFU may be used for transepidermal drug delivery.

A research article¹ details the study of HIFU for transepidermal drug delivery, using the Ultraformer MPT from Classys (Seoul, Korea), which has booster cartridges (treatment tips) designed specifically to facilitate drug delivery using the system. “Low-to-moderate ultrasound is commonly used for transepidermal delivery, but

HIFU has not been extensively studied,” said co-author, dermatologist Boncheol Leo Goo, MD, Naeum Dermatology and Aesthetics Clinic (Seoul, Korea).

“The booster cartridges are designed to promote penetration of DSB (deep synergy booster) serum, a powerful blend of 39 active ingredients containing a potent mixture designed for deep hydration, anti-aging and skin healing,” Dr. Goo continued.

Key components include glutathione, polydeoxyribonucleotides (PDRN) and *Centella asiatica* extract. It also features niacinamide and adenosine to improve skin texture and diminish wrinkles, hyaluronic acids for deep hydration, ten peptides to stimulate collagen and firm the skin, and 17 amino acids to nourish and protect the skin.” Booster cartridges come in three sizes (1.5 mm, 3.0 mm and 4.5 mm) to maximize speed and efficacy of delivery for both larger surfaces and harder-to-reach areas and according to variable skin thickness.

In the study, human-derived skin tissue samples (full skin, 2 cm x 2 cm) were divided into three groups: one received 10 HIFU irradiation shots, another 20 shots and the final was the untreated control. According to Dr. Goo, results indicated that penetration of topical drugs or cosmeceuticals significantly increased in an energy-dependent manner after treatment. Cumulative changes were also observed in the component-tagged fluorescence intensity over time.

“Remarkably, HIFU not only enhanced epidermal saturation, but also facilitated passive permeation into the dermis. These findings indicate that HIFU effectively promotes transepidermal drug delivery,” Dr. Goo explained. “This suggests applied ingredients can be delivered into the skin concurrently with HIFU treatment in dermatological applications – not by the conventional action of dermal matrix transformation as with localized coagulation. Instead, by diffuse heat generation on the surface using a continuously moving applicator, which is a novel method among focused ultrasound devices.”

“In general, HIFU-assisted enhanced delivery offers significant advantages for certain types of active ingredients, especially those requiring enhanced penetration and targeted delivery,” Dr. Goo continued. “However, care must be taken to avoid compounds that are heat-sensitive or cause skin irritation. Therefore, it is recommended that Ultraformer Booster Cartridges be used only with DSB serum and not in combination with other drugs.” Further study may reveal how other compounds may be delivered using the technology.

Ultraformer MPT is the latest generation in the Ultraformer series, utilizing advanced micro and macro ultrasound energy for aesthetic applications. “The ideal candidates for Ultraformer MPT Boosters are patients with mild to moderate skin laxity, particularly those who want to avoid the risks and downtime associated with surgical procedures,” Dr. Goo concluded.

Reference:

1. Lee SW, Goo BL. High-intensity focused ultrasound enhances drug penetration into the human skin in the Franz diffusion cell. *Clin Cosmet Investig Dermatol* 2024;17:1711-1721.



Before and after treatment with the Ultraformer MPT Booster
Photos courtesy of Classys



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