

# Transdermal Delivery

## Exciting Growth Area for Aesthetics

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Transdermal drug delivery (TDD) offers a non-invasive, patient friendly treatment approach to a variety of aesthetic ailments such as cellulite, facial rejuvenation and body recontouring, which aesthetic industry professionals find very appealing. Delivery of ingredients through the skin offers highly targeted treatment without the potential side effects associated with systemically administered medications and eliminates the downside of injection delivery.

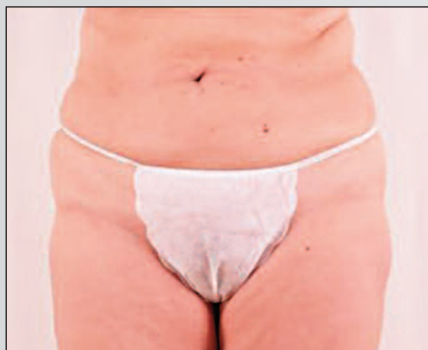
Current TDD technology is focused in two areas – development of medications to be delivered transdermally and the development of devices used in combination with permeation enhanced medications. Compared to patch technology, which is deemed passive, innovations designed to increase the flux of a drug across skin are classified as active devices.

Active devices, like the DermaWave No-Needle Mesotherapy System™ (DermaWave, Loxahatchee, Fla.), utilize a technology called threshold electroporation, which exploits microconduits or micropores, to create a hydrophilic pathway and defeat the protective properties of the stratum corneum. Electroporation is different from iontophoresis, which uses low voltage current to deliver charged drugs through the skin. Significantly, the aesthetic industry is seeing a resurgence of iontophoresis systems in the market

largely due to the interest in transdermal treatments for cellulite. The waveforms used during transdermal delivery of substances via iontophoresis are only able to use appendageal routes of administration. A study at Roswell Park Cancer Institute (Buffalo, N.Y.), compared simple iontophoresis with electroporation and found that electroporation was 500 times more effective in delivering molecules deep into tissue.

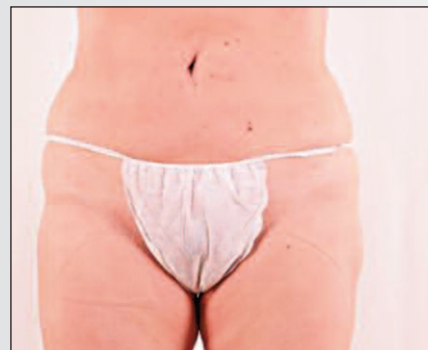
Devices promoted for TDD should demonstrate a capability of delivering molecules to a specific depth in tissue that matches the conventional injection method. They should also be capable of doing this without partial removal of the stratum corneum via microdermabrasion. The use of microdermabrasion on patients requiring cellulite intervention can be problematic due to the time required to impact thigh, abdomen or buttock areas, as well as the residue from the abrasive material remaining, prior to the application of gel based medications.

Radioactive lymphography is used to monitor the depth and speed of substance transfer into tissue as well as retention time over a specific period. Manufacturers making claims for this application should be able to reference research that demonstrates efficient transfer of material to a required site of effect.



Abdomen and flanks before Tx

Photos courtesy of Christopher Ho, M.D.



Abdomen and flanks one month after ten DermaWave DermaDissolve treatments

Most important, for cellulite and fat dissolve applications, is addressing all phases of this disease's etiology by targeting vascular and arteriole flow, microcirculation, edema reduction and lymphatic drainage.

Protocol sequencing also plays a role in effective treatments. Iontophoresis devices utilize a single current, usually a Galvanic waveform, sometimes configured as constant current or a simulated pulse. Constant currents trigger tissue accommodation and potentially defeat substance transfer to any great depth. Most important, for cellulite and fat dissolve applications, is addressing all phases of this disease's etiology by targeting vascular and arteriole flow, microcirculation, edema reduction and lymphatic drainage. A single current waveform is unable to address these deficits and effectively deliver medication to the required depth.

For example, the DermaWave No-Needle Mesotherapy System utilizes a combination of waveform sequences to achieve electroporation of the tissue area and may be accompanied by delivery of ingredients. A second and sequential protocol phase uses a different electrical waveform to continue the effects achieved in phase one, increase blood flow, metabolic rate, tone muscle and assist in cleaning the extra cellular matrix. A third and final phase focuses on lymphatic drainage. Prior to electroporation, a dual wavelength laser is used to kick start the treatment process by increasing cell permeability and blood flow. Red laser energy is absorbed by the cytochromatic cells and is converted to cell energy in mitochondrias which are stimulated and better prepared

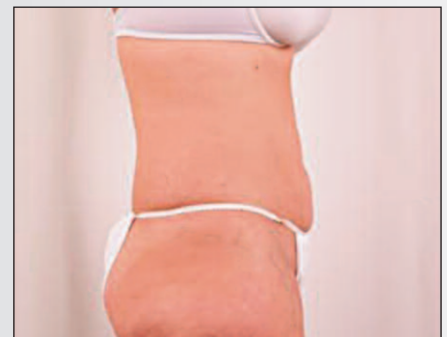
for fat consumption. Infrared laser light penetrates deeper than 685 nm and stimulates blood flow.

At the physicians' discretion, an active gel may be used with the system, containing many of the ingredients used in conventional mesotherapy injections. These include sodium deoxycholate partnered with phosphatidylcholine (PC) to flush out and dissolve the content of fat cells; aminophylline to stimulate the release of fat; Carnitene to burn fat and provide a strong antioxidant effect; Mellilotus to improve microcirculation and assist lymphatic drainage and Yohimbine to target localized fat and partner with other ingredients to dissolve the contents of fat cells. Active gels used with the DermaWave system require a prescription and are ordered from a formulating pharmacy.

Patient selection plays an important role in the selection of candidates. Typical patients have a BMI of less than 25, are in the age group of 20-55 and exhibit grade four cellulite or lower. The aim of treatment, carried out over ten sessions, is to smooth areas affected by dimpling. For fat dissolution, a different active gel is used in combination with the cellulite formula. For facial photoaging treatment, an active gel is used which contains estriol, dimethylaminoethanol (DMAE), hyalouronic acid, retin-A and a permeation enhanced peptide complex.



Abdomen before Tx



Abdomen six weeks after ten DermaWave DermaDissolve treatments

Photos courtesy of Christopher Ho, M.D.