

Studies Confirm Efficacy of DermaWave No-Needle Mesotherapy

By Bob Kronemyer, Associate Editor

DermaWave's No-Needle Mesotherapy™ (NNM) system utilizes a sophisticated transdermal delivery technique called threshold electroporation and aquaphoresis to duplicate the effects of conventional mesotherapy without needles. The benefits to this approach are obvious in terms of patient comfort, elimination of potential side effects and even distribution of active ingredients to a precise and consistent depth in tissue. Additional benefits also accrue to physicians through the ability to delegate the non-invasive treatment to ancillary personnel.

Three treatment protocols are currently being utilized by DermaWave users and are directed at cellulite, DermaDissolve for deep fat applications and facial treatments for general skin rejuvenation and wrinkle reduction.

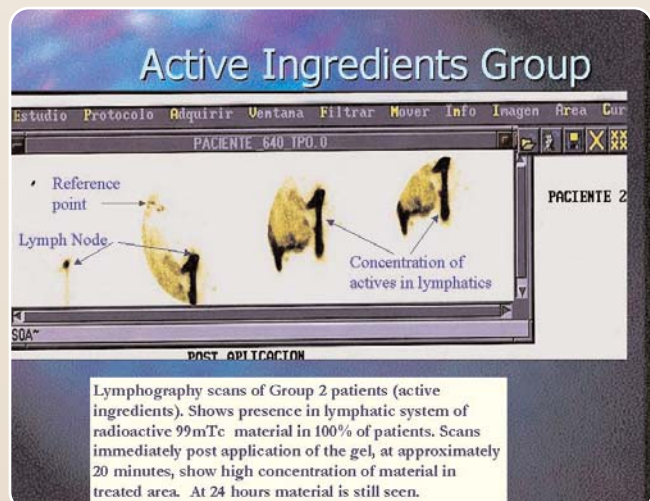
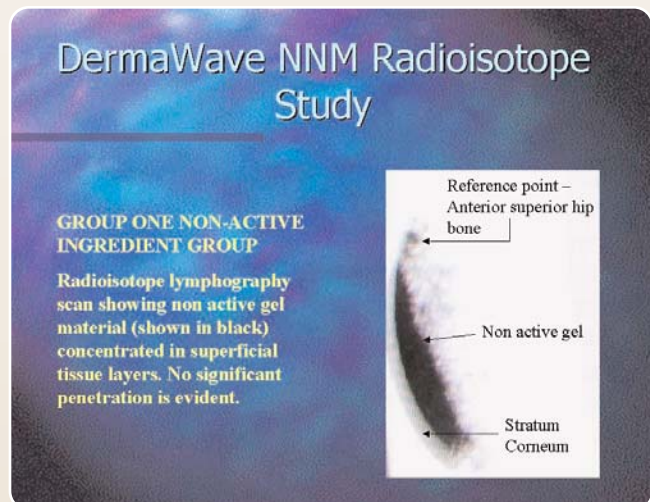
Two double blind studies, conducted at major university centers in Buenos Aires and Pretoria, South Africa, confirm the benefits of the DermaWave No-Needle approach and allow objective comparisons between the conventional needle technique and the No-Needle treatment.

First, an ingredient penetration study utilized a sophisticated technique called radioisotope lymphography employing a 99 mTc Technetium meta stable tagging technique designed to trace the ingredient passage through an intact stratum corneum to an appropriate site of action in the extracellular matrix and dermis. The technique also monitors the duration of effect of the ingredients in tissue at specified time intervals after delivery as well as presence of the ingredients in the lymphatic system.

Two gels were used in the penetration study – one without active ingredients and comprised of a viscosity matched ultrasound gel – and a second, active ingredient gel, formulated specifically for use with the DermaWave NNM system and containing a standardized mix of ingredients typically used in injection mesotherapy.

Two groups of patients were selected – one group receiving the non-active ultrasound gel while the other group received the active gel supplied by College Pharmacy (Colorado Springs, Colo.). Both gels were delivered through an intact stratum corneum utilizing a standard protocol developed by DermaWave. The company uses a four stage delivery protocol utilizing a dual wavelength laser, followed by three sequences of electrical waveform. At the discretion of the physician, a prescription medication encapsulated in a permeation enhanced gel is delivered to a selected tissue area. Typical treatment time for a specific area, such as the thighs or buttocks, is approximately 23 minutes.

Results of the radioisotope lymphography study show that all patients receiving the non-active ultrasound gel showed minimal penetration – with the majority of the tagged material residing in the uppermost layers of the epidermis. However, 100% of the second group, receiving the permeation enhanced active material, showed transdermal penetration through an intact stratum corneum to the extra cellular matrix of the dermis. Heavy concentrations of actives were detected in the lymphatic system after approximately 20 minutes and remained for 24 hours following application.



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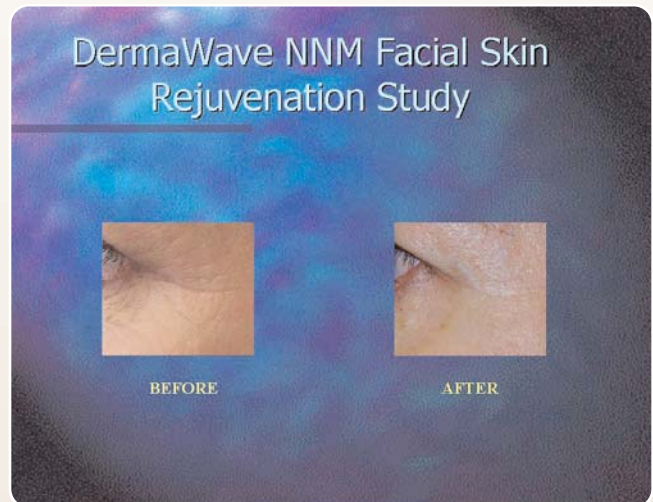
This study confirms the ability of the system to accurately place active substances into the dermis while avoiding problems associated with needle injection. Moreover, compared to needle injection, distribution of active substances is extremely even across a given area and avoids the potential for under or over treatment of a tissue region due to needle delivery of too little or too much medication.

A second study, performed at the department of pharmacology, University of Pretoria, South Africa, was designed to evaluate the DermaWave NNM system for facial skin rejuvenation in patients with photo-aging. Repeated sun exposure results in damage to elastic and collagen fibers causing characteristic changes in the appearance and function of the skin i.e. loss of elasticity, collagen decrease and wrinkling. Transdermal administration of medications is preferred because it is non-invasive, safe, effective and easy to administer

Percutaneous absorption of most water soluble agents is prevented by the stratum corneum. Electroporation is a method developed to increase the permeability of the skin surface to allow molecules to pass through the skin when applied topically. This method relies on the creation of aquapores in the skin (aquaphoresis), which results in penetration pathways different from the appendages normally utilized by techniques such as ultrasonic phonophoresis.

An *in vivo* study was conducted to observe the effects of the DermaWave NNM system on photo-aging through transdermal delivery of a combination of agents i.e. hyaluronic acid (HA), retinoic acid (RA) and dimethylaminoethanol (DMAE). A five week clinical trial was conducted where 15 volunteers were treated with the DermaWave system. All volunteers showed a reduction in photo-aging. This system successfully increased transdermal drug delivery and therefore is a safe, effective alternative to painful needle mesotherapy.

In vitro effects of the combination of agents and individual components on collagen synthesis and cell proliferation in chick embryonic fibroblasts were also studied. Hyaluronic acid, retinoic acid, DMAE and the combination drug reduced the effects of photo-aging. Hyaluronic acid, DMAE and the combination drug increased collagen synthesis in chick embryonic fibroblast cultures. *In vitro* retinoic acid inhibited cell proliferation, but when topically applied it is known to stimulate collagen formation in the upper dermis and accelerate the repair process of photo-aged skin. Crystal violet staining showed an increase in fibroblast proliferation when treated with DMAE, and a



decrease in cell growth when treated with retinoic acid and hyaluronic acid. Alcian blue staining indicated enhanced collagen synthesis with DMAE, hyaluronic acid and the combination of drugs.

DermaWave electroporation of the combination drug, containing DMAE, RA and HA, resulted in a significant reduction of coarse wrinkles after five treatments (one treatment per week). This is comparably better than mesotherapy results reported in literature.