The SilkPeel System: Histology Study on the use of a Dermalinfusion System for Dermatologic Conditions

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February 15, 2005

INTRODUCTION

SilkPeel's Dermalinfusion is a new format microdermabrasion skin treatment that does not use crystals or other abrasive particles that can irritate the skin. It is the only unique procedure that provides both non-invasive exfoliation and delivery of skin-specific topical solutions under pressure. The procedure is safe and painless, and patients achieve optimum results on an accelerated basis without the complications and discomfort usually associated with microdermabrasion, chemical peels, lasers and other risky treatments that can irritate the skin.

Traditional microdermabrasion is the second only popular non-invasive dermatologic office procedure. However, the true benefits of traditional microdermabrasion are limited to mildly exfoliating the very surface of the epidermis and causes release and disposal of contaminated aluminum oxide or other particles. We know from previous studies that microdermabrasion is a superficial peel which can be repeated at 2 weeks intervals because the skin histologically recovers within 1 to 4 days[1]. Studies with dry, crystal microdermabrasion done weekly demonstrate histologic and microscopic improvement in photoaging and intrinsic aging[2,3]. The studies show that skin texture, pigmentation, skin atrophy, oiliness, dilated pores, laxity and telangectasias can be improved with weekly microdermabrasions.

The Silkpeel relies on a patented combination hand piece and a completely new approach to microdermabrasion. The resulting effect is a simultaneous exfoliation and Silkpeel Topical Delivery™. The added dimension of using effective and safe topical DermInfusion solutions to create additional effective treatment and to identify and treat patients specifically is unique for the cosmetic dermatologist.

The hand piece has three functions. First, there is negative pressure that creates an ideal environment for proper microdermabrasion. Second, the hand piece abrades evenly with a diamond tip. Thirdly, the hand piece has continuous flow of specific solutions that treat the skin. The machine provides a regulated flow of solutions and maintains the negative pressure.

METHODS AND MATERIALS

The study was composed of volunteer patients who were undergoing facelift procedures. The skin was pretreated one to three days before the facelift procedure in the preauricular

face area where the skin was planned to be excised. The skin was carefully marked and treated with the SilkPeel as outlined below. During the facelift procedure, the SilkPeel treated skin was dissected carefully away and put into 10% formalin bottles immediately. The tissue samples were sent for preparation processing by imbedding onto paraffin sections and sectioned with a microtome. The sections were then stained for hematoxylin and eosin. The slides were sent to a dermatopathologist for evaluation and a calibrated micrometer was used to measure depths of effect from treated tissue.

The SilkPeel patented process contains a special hand piece with an internal diamond fraize abrader, and connectors for fluid delivery to the skin and negative pressure. The machine regulates a precise vacuum pressure of 12 PSI. The pressure is regulated to fluid infusion of 20 ml/minute.

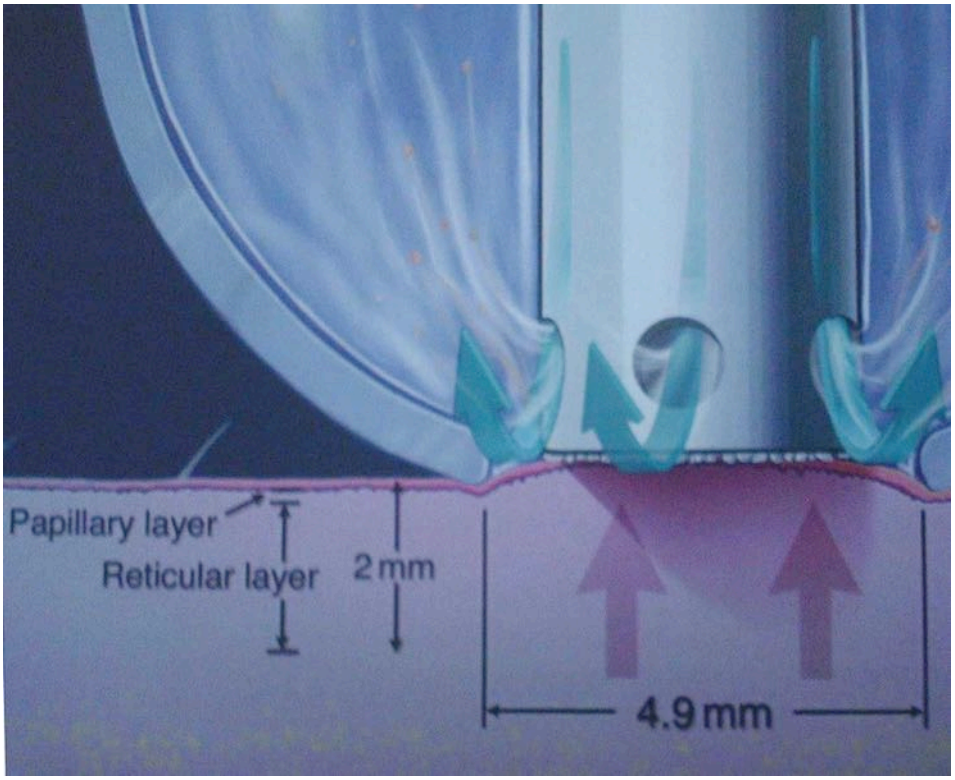

Figure I. Hand piece in contact to the skin with even abrasion, fluid flow, and negative pressure. The skin is brought past the diamond fraize in the presence of the fluid

RESULTS

The results demonstrate that the SilkPeel evenly abrades the skin. All the biopsies demonstrated even abrasion with similar depths of effect. Histologic studies revealed a uniform, even abrasion to the depth of 30-35 microns within the epidermis on preauricular skin. The abrasion was maintained in the granular layer of the epidermis. The majority of the epidermal integrity remained intact. Areas of the SilkPeel treatment

demonstrated at two days, regrowth of the surface epidermal layers. Granular layer regrowth and stratum corneum regrowth was evident.

Immediate exposure of the abraded skin to the fluid demonstrates an interesting effect. The keratinocytes show marked swelling from hydration. The upper papillary dermis also demonstrates edema around the collagen fibers and around the vascular structures.

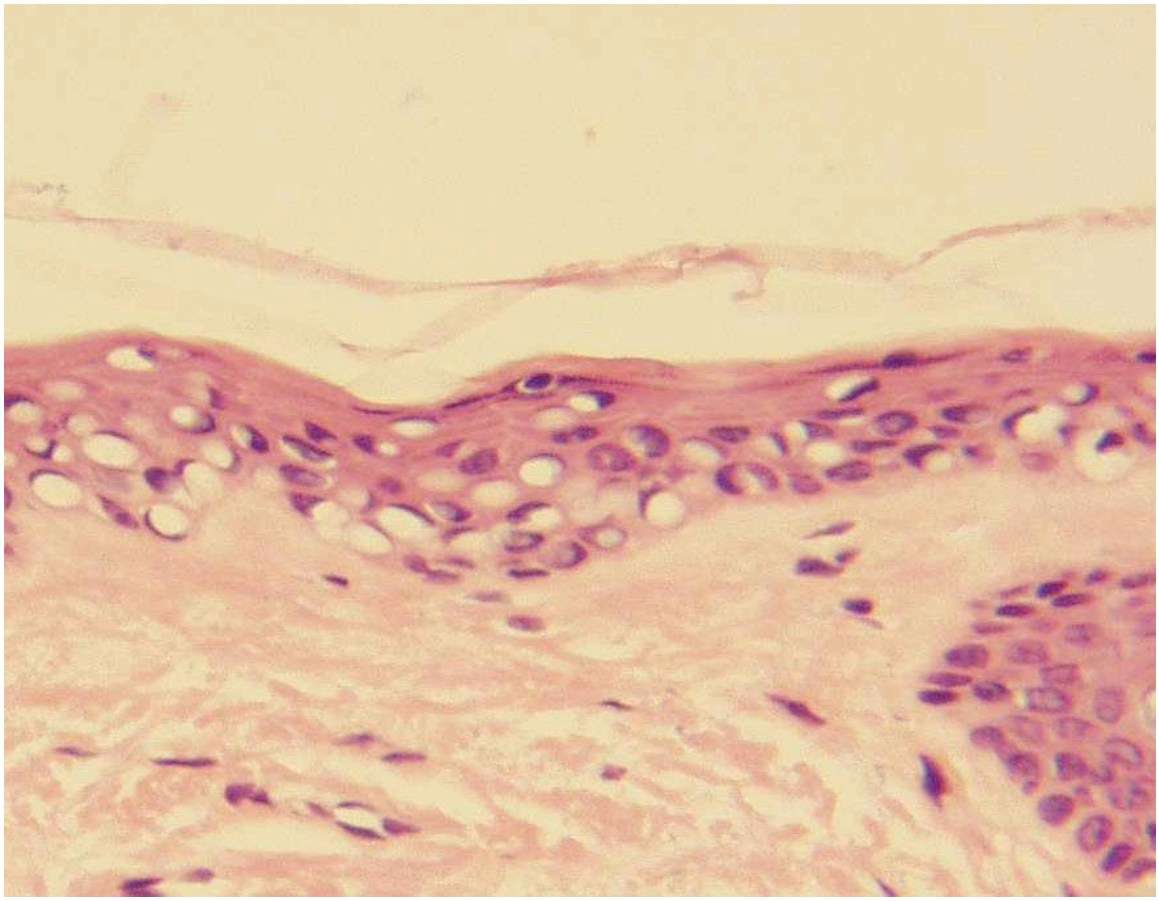

Figure 1. The first histologic slide demonstrates a uniform, even abrasion to the depth of 30-35 microns within the epidermis on preauricular skin. The stratum corneum is removed and portions of the granular layer are also removed in sections.

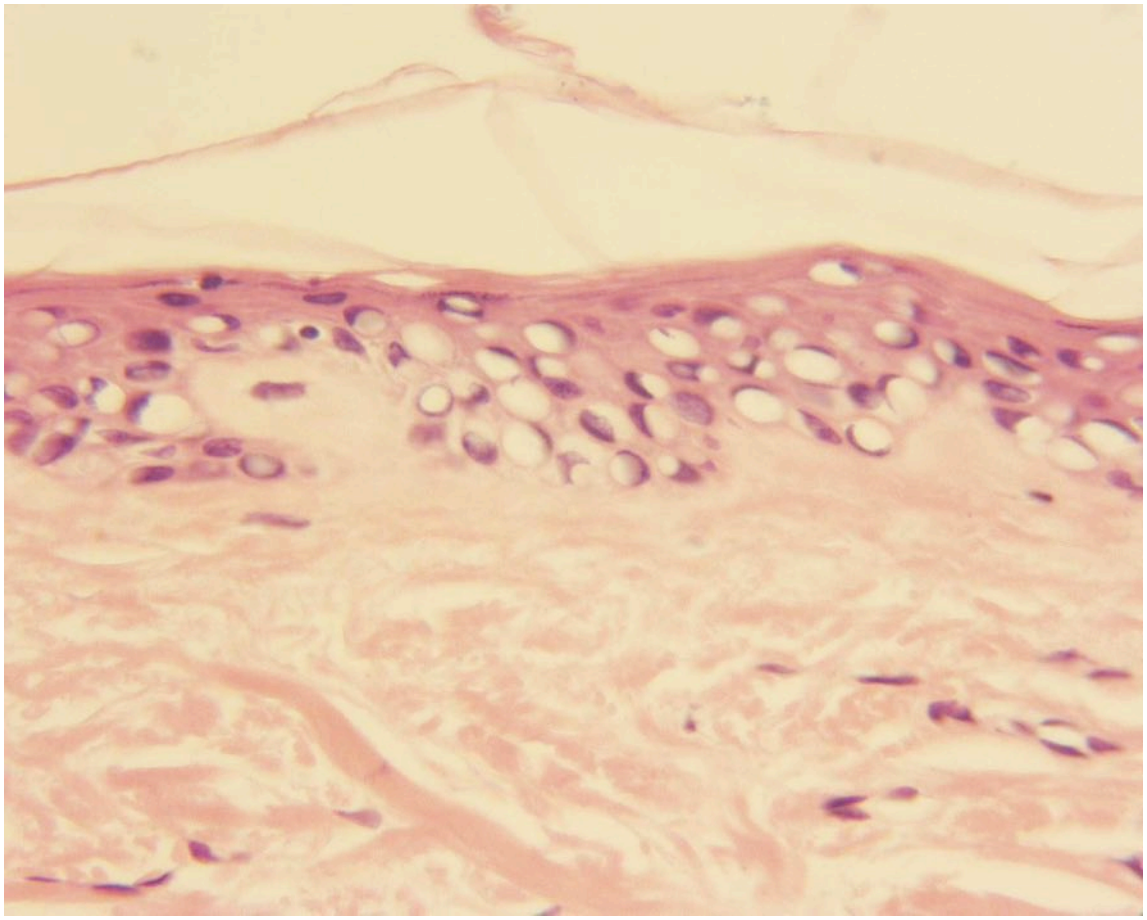

Figure 2. On higher magnification there is vacuolarization and margination of the nuclei, suggesting enlarged cytoplasm. This effect is consistent with rapid hydration of the keratinocytes. The dermis demonstrates dermal edema and a mild inflammatory infiltrate.

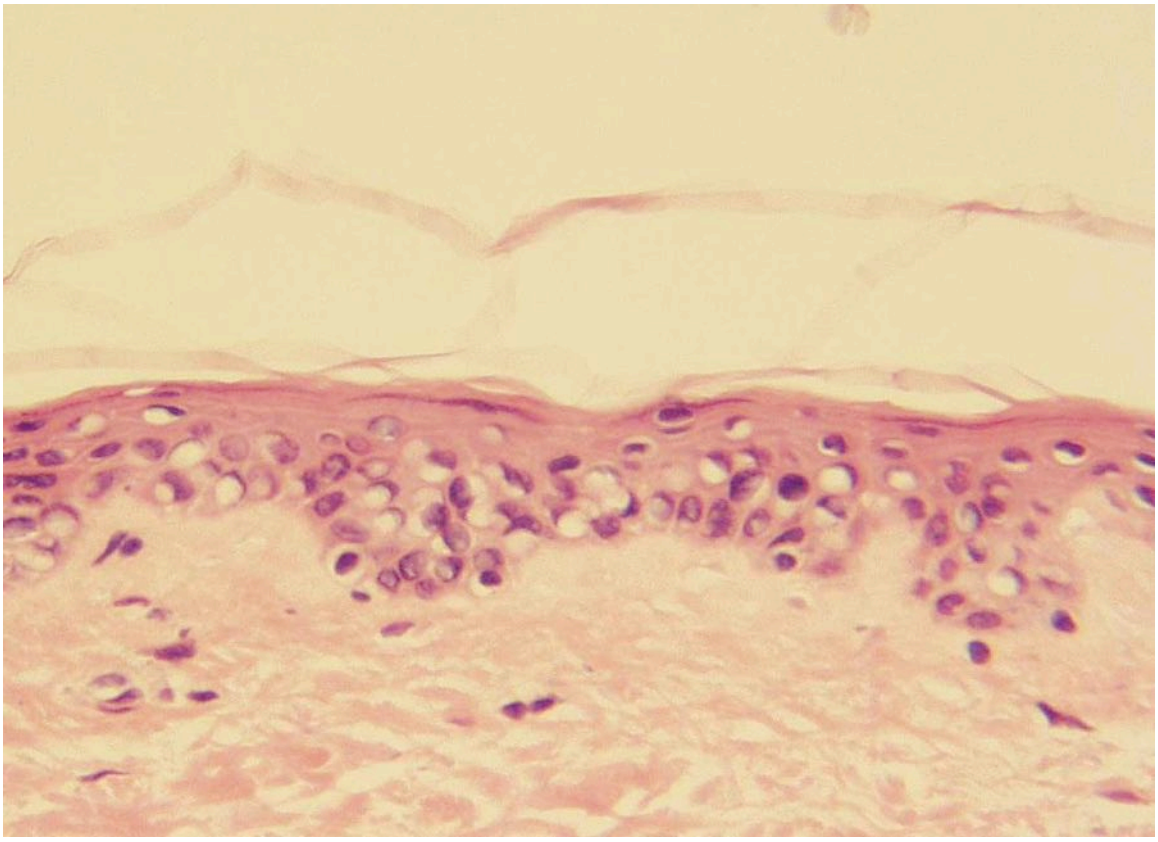

Figure 3. In specific sections, there is epidermal regrowth of keratinocytes. New keratinocytes mostly appear to be in the vicinity of follicular structures.

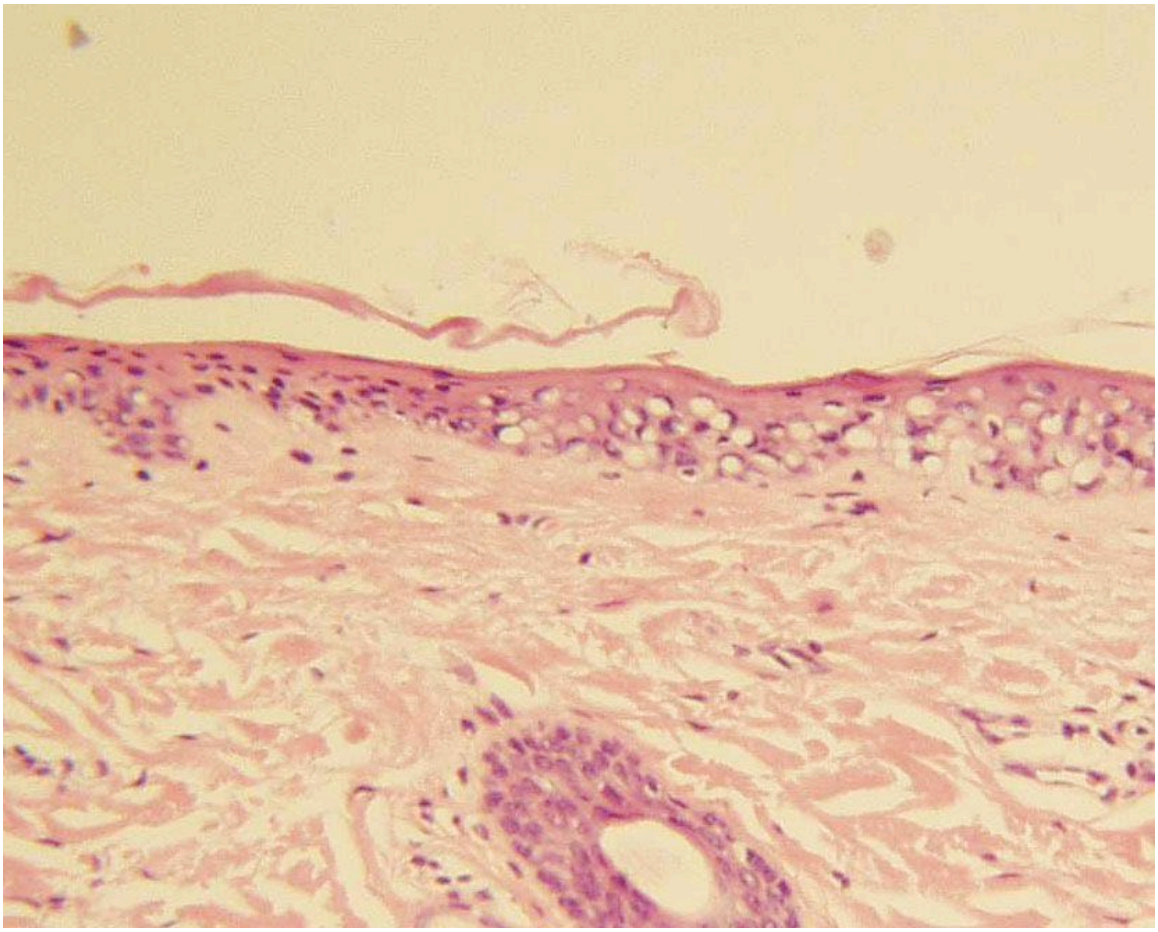

Fig 4. This slide demonstrates the edge of treatment for the SilkPeel on the right side and untreated epidermis on the left side. The hydration effect is dramatically shown by the enlarged keratinocytes with the displaced nuclei on the SilkPeel areas compared to the untreated areas. Also, the rapid hydration effect has increased the SilkPeel treated epidermal thickness by 70%.

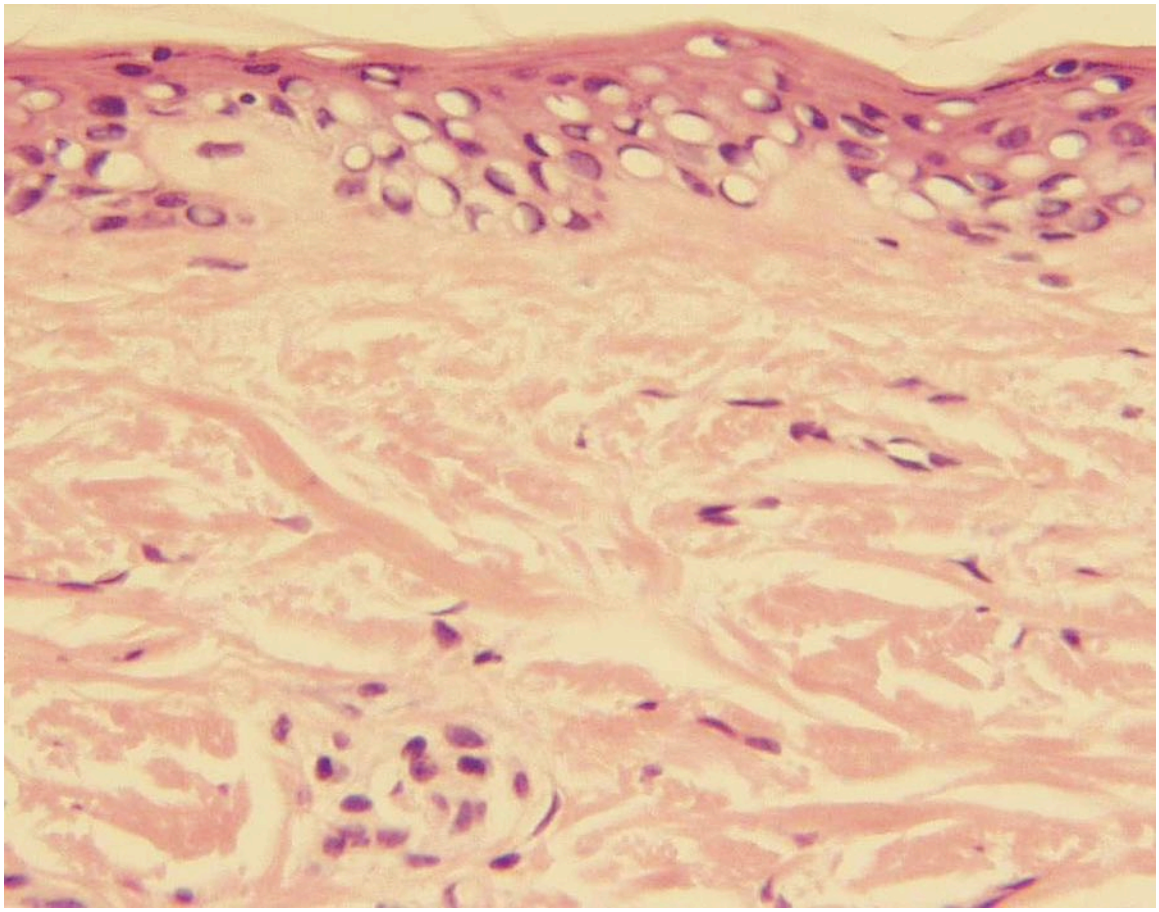

Fig 5. Wide spaces between the collagen bundles and swollen vascular structures demonstrate papillary dermal edema. Dermal edema was present after one day, suggesting solution delivery to the papillary dermis.

CONCLUSION

The study proves that the SilkPeel DermaInfusion is a safe abrasion machine for lightly abrading the skin and allows for even treatment across the facial skin.

The SilkPeel can be used with various solutions for ideal treatments. The SilkPeel allows maximal delivery of the agents for acne, pigmentation and aging. These solutions, made safely, can enhance the efficacy of the SilkPeel. The histology demonstrates an ideal, immediate delivery of active solutions for treatments. Removing the stratum coreum and the upper layer of the granular layer removes the Odland Bodies[6]. Odland Bodies are impacted membrane bodies that are compressed membrane materials residual from cell organelles. Odland Bodies are an important barrier functioning to limit TEWL (trans-epidermal water loss)[7,8]. By temporarily, lifting off the Odland Bodies, the cells demonstrate hydration and fluid delivery.

Clinical trials show that the solutions for acne, pigmentation, and aging are effective for the treatment of the specific conditions. Additionally studies are demonstrating efficacy for hair growth using a low concentration of minoxidil. Knowing that the SilkPeel can greatly improve the penetration and effectiveness of specific solutions, expands the treatment protocols. Future studies that are scheduled include treatments for

- Psoriasis
- Actinic keratosis
- Chronic eczema
- Preparation for resurfacing
- Preparation for photofacial
- Local anesthesia.

The histologic slides after 1 day demonstrate that there is a very safe and even abrasion that does not disturb vital cutaneous integrity. Additionally, there is delivery of solutions to the layers of the epidermis and to the papillary dermis. The abrasion is not damaging and still allows regrowth of keratinocytes evident after 1 day. We present here a unique microdermabrasion that functionally may have the most potential for treating a variety of problems in our dermatology offices.

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