

Fractionated delivery systems for difficult to treat clinical applications: acne scarring, melasma, atrophic scarring, striae distensae, and deep rhytides.

Abstract

Fractional resurfacing or laser therapy (FLT) represents a technology that seeks to address the limitations of both ablative resurfacing and nonablative treatments. Many companies now offer versions of fractionated erbium or carbon dioxide lasers. The purpose of this paper is to examine FLT for difficult to treat applications such as melasma, acne scarring, atrophic scarring, striae distensae, and deep rhytides. Fractional laser therapy is a truly novel approach to many conditions, especially those with dermal pathology. Although published peer review data is limited, the ability to effectively and safely treat these conditions in all skin types appears to have been significantly enhanced with this new modality. We are early in our scientific explorations of what is possible with FLT.

Introduction

Fractional resurfacing or laser therapy (FLT) represents a technology that seeks to address the limitations of both ablative resurfacing and nonablative treatments. The former, although providing excellent clinical outcomes, has a relatively high degree of risk and downtime; whereas the latter was embraced for its lack of downtime and complications, even though patients' results were modest. (1) With fractional resurfacing, the idea is to achieve ablative results with the low side effect profile and shortened downtime of nonablative treatments.

Exclusive of photodamage, for which there are many effective therapies, (2-5) there are a number of clinical entities for which there is little consensus on the best of treatment. They are difficult to treat because their main pathology involves dermal deposits or atrophy. FLT appears to be the first technology that actually removes portions of dermis and heals the subsequent wounds.

The concept is to drill microscopic holes into the dermis in a grid pattern. An analogy often quoted is that of aerating a lawn. The "plugs" (dubbed MENDS for microscopic epidermal necrotic debris) (6) remain and are expelled via a transepidermal elimination mechanism with intact stratum corneum over 7 to 10 days. The consequences of this are twofold: 1) dermal conditions that have been approached indirectly, via epidermal wounding, are now being directly wounded as portions of abnormal dermis are removed; 2) the remaining adjacent intact dermis and epidermis allows for rapid healing without relying on the presence of multiple adnexal structures. (6) The latter allows for safe treatment of areas such as the neck and chest, which are poor in adnexae.

The 1550 nm erbium laser (Fraxel, Reliant Technology, Mountain View, CA) was the first commercially available device designed to adapt this concept. Most of the available literature describes the first generation of this device (Fraxel SR), whereas there is limited information on the second generation Fraxel SR 1500. Other companies have developed their own fractional resurfacing devices or handpieces, available in both erbium and carbon dioxide varieties (Table 1). Finally, a novel nonablative combination of the fractionated diode laser (915 nm) and radiofrequency device has been designed (Matrix IR, Syneron Medical Ltd) to address deep rhytides.