

Supplement to November 2002

**skin**  
AGING



HARNESSING **LIGHT**  
TO TREAT **STRETCH MARKS**  
AND OTHER HYPOPIGMENTED SCARS



HMP COMMUNICATIONS

Supported by an educational grant from Lumenis Inc.

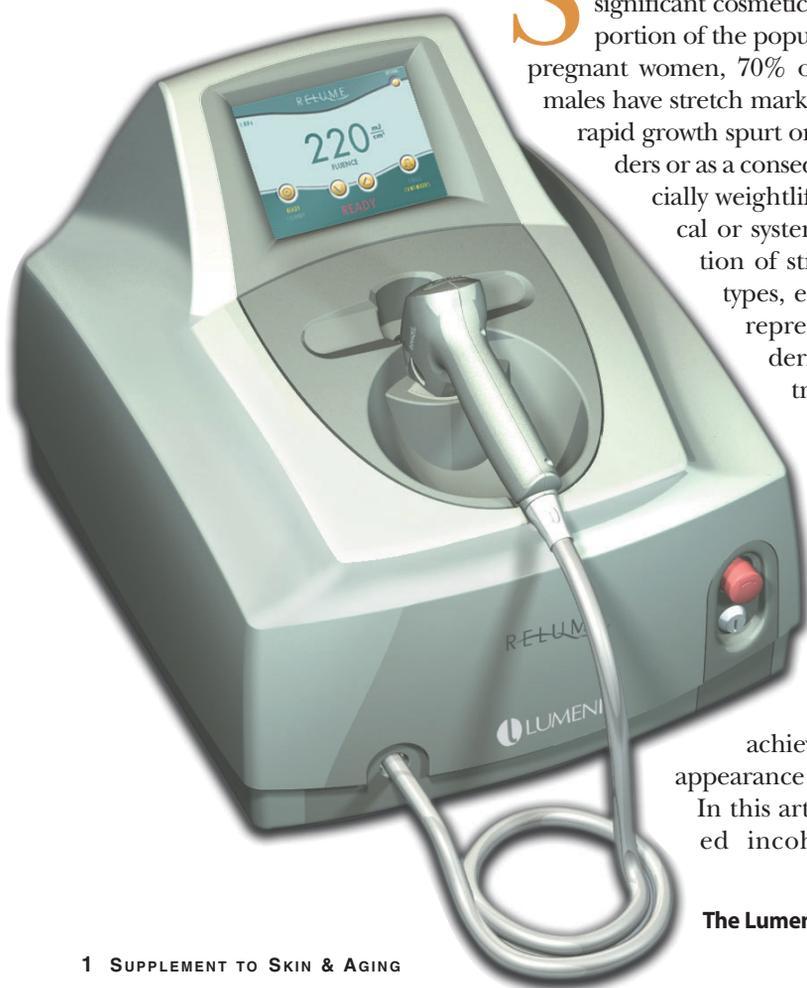
# HARNESSING **LIGHT**

## TO TREAT **STRETCH MARKS** AND OTHER HYPOPIGMENTED SCARS

**New research highlights successes in repigmenting mature stretch marks and hypopigmented scars.**

**S**tretch marks, or striae distensae, occur very commonly and create significant cosmetic skin disfigurement. These marks affect a large portion of the population. It's reported that approximately 90% of pregnant women, 70% of adolescent females and 40% of adolescent males have stretch marks.<sup>1</sup> In men, striae typically occur as a result of a rapid growth spurt or weight gain at puberty, from endocrine disorders or as a consequence of participation in certain sports, especially weightlifting. Excessive or chronic use of potent topical or systemic corticosteroids also promotes the formation of striae.<sup>2</sup> Although frequently classified into two types, early (red) and mature (white or alba), striae represent linear dermal scars accompanied by epidermal atrophy. While the use of lasers or light treatments to diminish the appearance of striae has been reported by a number of sources, controlled clinical studies are rare. New evidence suggests that targeted light therapy may have a significant benefit. We believe that the hypopigmented component of striae can be safely treated with targeted 290 nm to 400 nm ultraviolet (UV) light. The improvement may be enhanced in combination with other therapeutic modalities that aid in collagen remodeling in order to achieve safe and effective improvement in the appearance of striae distensae.

In this article, we'll focus on the use of a novel targeted incoherent UV light source, the ReLume™



**The Lumenis ReLume Repigmentation Phototherapy System**



**Hypopigmented traumatic scar before (at left) and after eight ReLume treatments (at right).**

*Photos courtesy of Dr. Roy Geronemus & Dr. Macrene Alexiades-Armenakas*

Repigmentation Phototherapy System (Lumenis, Inc., Santa Clara, CA), for treating mature striae and other hypopigmented non-linear dermal scars. First, we'll review the etiology of striae and discuss other treatments that have been employed to diminish their appearance.

### **ETIOLOGY**

The factors that lead to the development of striae are poorly understood. Early changes include inflammation and capillary dilation. It is believed that stress shattering of the collagen framework initiates an inflammatory response that ultimately results in a thin and flattened epidermis with loss of the rete ridges and loss of melanocytes. Elastic stains show breakage and retraction of the elastic fibers in the reticular

dermis.<sup>3,4</sup> Other dermal changes include thin, densely packed collagen bundles arranged in a parallel array horizontal to the epidermis at the level of the papillary dermis. Extracellular matrix alterations that mediate the clinical appearance of stretch marks remain poorly understood. With time, striae assume their typical white atrophic appearance with the long axis aligned parallel to the lines of skin tension. According to McDaniel, this development is very similar to that of surgical wound healing.<sup>5</sup>

### **A REVIEW OF TOPICAL TREATMENTS FOR STRIAE**

Improvement in the appearance of striae by topical

agents has been aggressively sought for many years. Topical tretinoin in a 0.1% concentration has been shown to be effective for striae rubra or early, red, inflammatory stretch marks.<sup>6</sup> However, it failed to significantly improve mature stretch marks (striae alba).<sup>7</sup> Whether the improvement of striae rubra leads to a diminution in the final appearance of the striae remains unknown. Recent data suggests that the application of 20% glycolic acid (MD Forte, Allergan) with either 0.05% tretinoin emollient cream (Renova,

Ortho Pharmaceuticals) or 10% L-ascorbic acid (SkinCeuticals) on a daily basis may slightly improve the appearance of striae alba.<sup>8</sup> In general, topical treatments have yielded disappointing results with only modest improvement reported in mature striae.

### **LASER/ INTENSE PULSED LIGHT (IPL™) TREATMENT OF STRIAE**

Many lasers including the CO<sub>2</sub>, Erbium:YAG, 1320 nm Nd:YAG and pulsed dye lasers have been used to treat scars and stretch marks.<sup>9,10</sup> Many have also used Intense Pulsed Light (IPL) with filters ranging from 550 nm to 590 nm, but no controlled trials have been performed. IPL induces some improvement of the erythematous component of new striae; however, the effects on mature striae are uncertain and have not been thoroughly studied.



**Handpiece for the ReLume system.**

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Pulsed dye laser therapy has been shown to improve all types of striae, but red, early striae improve more dramatically while white mature striae are less responsive. The optimal fluence was determined to be 3 J/cm<sup>2</sup> using a 10-mm spot size. This study also revealed that laser therapy of striae requires patience with continual improvement observed 6 to 12 months after treatment.<sup>11</sup> Using similar pulsed dye laser treatment methods, other investigators failed to note much clinical or histological improvement of striae.<sup>12,13</sup> The 1320 nm Nd:YAG dynamically cooled laser has been demonstrated to produce modest improvement (about 10% per treatment) in the texture of mature striae.<sup>14</sup> Therefore, lasers and light sources have not achieved consistent success nor has the mature hypopigmented component of striae been specifically addressed.

### LIGHT-BASED TREATMENT OF HYPOPIGMENTED SCARS

We have had initial success treating hypopigmented scars using the ReLume Repigmentation Phototherapy System, which combines the benefits of safe and effective UV phototherapy with the latest advances in targeted light technology.

Pilot clinical investigations with approximately 50 patients from our centers combined have shown repigmentation in approximately 80% of patients within a 2- to 3-month period, with a total number of treatments up to 14. Treatment fluences are initially administered at or slightly below the erythemogenic threshold and the dose is increased as patients become more photo-tolerant. The induction and retention of pigmentation varies somewhat and may depend on several factors including the individual's skin phototype, the body site treated and the type and age of the lesion. However, marked improvement is commonly observed beyond 3 months post treatment. These clinical trials are ongoing and the outcomes reported here represent very early clinical results.

Scars treated with this light source have varied from surgical incisions to the hypopigmentation seen as a late side effect of CO<sub>2</sub> laser resurfacing. Excimer laser phototherapy and topical photochemotherapy have also been used to provide moderately to highly effective repigmentation of laser resurfacing-induced leukoderma.<sup>15,16</sup>

An example of traumatic surgical scar repigmentation is shown in the photos on the previous page. This patient's scar acquired robust pigmentation in eight ReLume treatments, performed weekly to bi-weekly with a fluence of 260 mJ/cm<sup>2</sup>.

Treatment times are short, and coverage of large areas can be achieved quickly using a delivery spot of adjustable size and shape. A spacer on the handpiece allows the practitioner to visualize the treatment field to improve the accuracy of treatments.

### LIGHT-BASED TREATMENT OF MATURE HYPOPIGMENTED STRIAE ALBA

Striae assume their typical white sunken appearance in a

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process very similar to that of surgical wound healing.<sup>5</sup> Based on the successful clinical trials of repigmentation of hypopigmented surgical scars, we believe that there is much promise in utilization of the ReLume device for selective repigmentation of mature striae alba. Initial clinical results have shown that the improvement of mature striae is possible with targeted UV phototherapy. Examples are shown in photos at right.

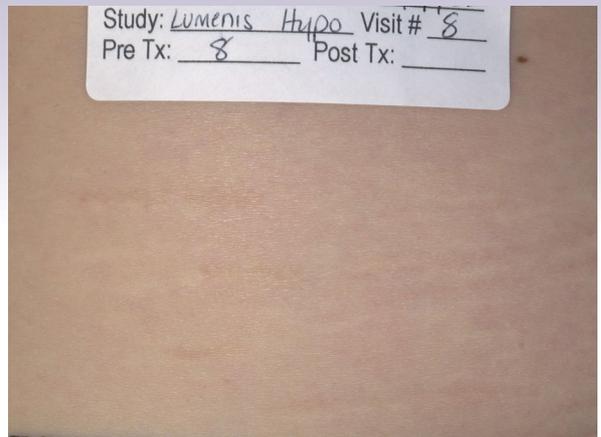
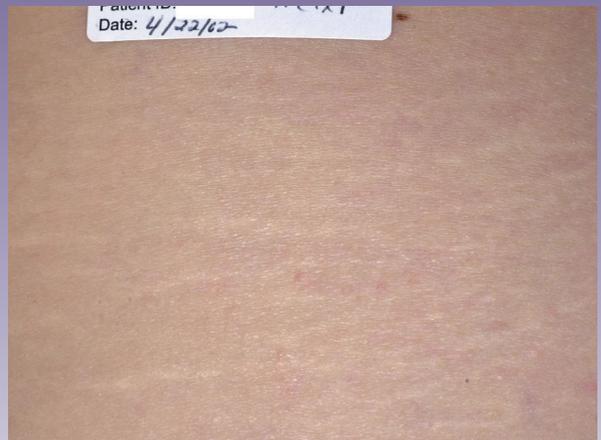
It is also interesting to speculate regarding the reversal of the atrophic nature of striae. The cutaneous responses to UV irradiation in human skin are well established. UVB irradiation results in epidermal hyperplasia and dramatic thickening of the stratum corneum.<sup>17,18</sup> Furthermore, UV irradiation can affect the arrangement of dermal matrix collagen and elastin proteins. This raises the possibility that targeted UV phototherapy administered with highly controlled doses will be able to treat both the depigmented and atrophic components of mature striae alba simultaneously. Ongoing clinical trials with histological evaluation will answer these questions.

## POSITIVE RESULTS

Striae are a very common cosmetic problem. There is great potential to improve the appearance by repigmentation of mature striae alba and hypopigmented white scars of multiple etiologies. Multicenter trials on hundreds of patients should be completed within the next year. The ReLume Repigmentation Phototherapy System appears to offer great promise. In preliminary clinical trials, excellent results have been observed with response rates as high as 80% in hypopigmented scars and mature striae alba. These results may be further enhanced in combination with other therapeutic modalities that aid in collagen remodeling in order to achieve safe and effective improvement in the appearance of mature striae distensae.

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**Stretch marks on the right hip of a female patient before (top photo) and after (bottom) seven ReLume treatments. Total cumulative dose was 640 mJ/cm<sup>2</sup>.**

*Photos courtesy of Dr. Roy Geronemus & Dr. Macrene Alexiades-Armenakas*

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