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CRYOGEN SPRAY COOLING IN CONJUNCTION WITH 532 NM LASER IRRADIATION OF PORT WINE STAINS

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Purpose: To investigate the effectiveness of cryogen spray cooling in protecting the epidermis from 532 nm laser induced thermal injury during treatment of port wine stain (PWS) birthmarks.

Methods: Selected PWS sites of volunteers were irradiated with a Nd:YAG laser (wavelength = 532 nm, pulse duration = 2-10 ms, spot size = 3 mm, incident fluence = 5-15 J/cm²). Millisecond R-134A (boiling point = -26 °C) spurts were sprayed onto the skin surface immediately prior to laser irradiation. Infrared emission from skin was collected by an InSb focal plane array to measure the temporal radiometric temperature change. An algorithm was used to compute the spatial temperature distribution within skin from the temporal infrared measurements.

Results: Laser induced temperature increase due to epidermal melanin absorption was consistently maintained below 60 °C when the skin surface was sprayed with a short cryogen spurt immediately prior to irradiation. As computed by the algorithm, laser induced temperature distribution within blood vessels was not affected by the cryogen spurt sprayed onto the skin surface.

Conclusions: Successful 532 nm laser induced blanching of PWS without thermal injury to the epidermis can be obtained when spraying short cryogen spurts onto the skin surface.

CONCLUSION: Facial and leg telangiectasias can be improved with the PhotoDerm® VL system; however, long pulse duration treatments significantly improve the results obtained.

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LONG-PULSED 532nm LASER TREATMENT OF PORT WINE STAINS

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Port wine stains remain a challenge to the laser surgeon. 20 patients with port wine stains were treated with a long-pulsed 532nm Nd:YAG laser (Versapulse[®], Coherent Medical, Palo Alto, CA). Fluences of 9.5-16J/cm² with a 3 or 4mm spot, a 10msec. pulse, and a water-cooled chill tip at 4-5.5° C were used. The affected areas were treated with 1-3 passes at each session. 1-4 treatments were performed over a period of up to one year. Patients with pink lesions showed a gradual lightening much as has been observed with pulsed-dye laser treatments. Surprisingly, a group of patients with older lesions which were darker and almost papular showed remarkable improvement. Some of these were resistant to conventional pulsed-dye laser therapy. The unique chill tip, in firm contact with the skin, allows the delivered energy to remain relatively confined to the targeted, abnormal blood vessels and permits multiple low-peak temperature heating cycles in the form of multiple passes. The pressure of this chill tip might also compress the target and improve the efficacy of this laser. This preliminary study suggests the utility of the Versapulse[®] laser in the treatment of port wine stains.

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A COMPARISON IN THE TREATMENT OF LEG AND FACIAL TELANGIECTASIAS WITH THE PHOTODERM® VL SYSTEM USING LONG AND SHORT PULSE DURATIONS

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PURPOSE: The objective of this study was to compare the clinical effectiveness in treating leg and facial telangiectasias using the PhotoDerm® VL system with relatively short and long pulse durations.

METHODS: Twenty-five patients (>18 yrs) with facial and leg telangiectasias were included in the study. The PhotoDerm® VL system at default settings with relatively short pulse durations of less than 4 msec and variable fluences was used to treat facial and leg telangiectasias ranging in size from 0.1mm to greater than 1 mm in diameter. Similarly, the PhotoDerm® VL system was then used to treat facial and leg telangiectasias using relatively long pulse durations of greater than 10 msec and variable fluences. Each patient received multiple treatment sessions at 3-4 week intervals. Sequential and clinical graded scores were obtained preoperatively and at four week intervals post-operatively.

RESULTS: Clinical improvement was observed in all facial and leg telangiectasias with either short or long pulse durations; however, significantly improved results were observed with the longer pulse durations. An increase in side effects, especially hyperpigmentation, was also observed as fluences increased with the longer pulse durations.

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TRANSCUTANEOUS AND INTERSTITIAL LASER TREATMENT OF VASCULAR DISORDERS

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During the last 13 years several laser techniques have been invented and evaluated for the treatment of congenital and acquired vascular disorders by our group. Using flashlamp pumped dye lasers, argon-ion lasers and Nd:YAG-lasers, the application techniques are modified according to the type of disease, vessel size and perfusion respectively, from simple transcutaneous irradiation, laser treatment with several types of superficial cooling techniques to interstitial applications guided by duplex sonography.

Cooling techniques:

A cooling chamber provides skin protection and helps to minimize the use of anesthesia in the treatment of PWS with a flashlamp pumped dye laser (585nm). A flexible membran, facing the skin of the patient, provides close contact and good thermal conduction and the possibility of compression. The temperature and flow of the cooling fluid can be varied. The same cooling chamber is used with the Nd:YAG-laser for the scarless removal of leg teleangiectasias.

A permanent ice cube cooling during irradiation with a Nd:YAG-laser (1064nm) provides a safe protection of the skin and is most suitable for the treatment of hemangiomas with combined subcutaneous and cutaneous portions. Compression can be used to enhance the depth of the laser effect up to two centimeters.

Interstitial laser application:

The interstitial or intravascular application is suitable for large or only subcutaneous hemangiomas, venous vascular malformations and to