Usefulness of three-dimensional digital image analysis for objective evaluation of the efficacy of non-facial port-wine stain treatment with large spot 532 nm laser

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Abstract
Introduction: New devices such as the large spot KTP laser are being introduced for the treatment of port-wine stains (PWS).
Aim: To assess the efficacy of the large spot 532 nm laser for non-facial PWS with 3D image analysis and compare it with subjective evaluation.
Material and methods: Twenty PWS were photographed with a 3D photo unit before and after 532 nm large spot KTP laser treatment. Fifteen lesions were previously treated by different devices and five were not. Objective analysis of percentage improvement based on a 3D digital assessment of combined color and area improvement was performed and rates of improvement were determined as well as subjective evaluation of before and after images by a physician on a 5-grade scale.
Results: Mean objective response was 57.0%. A poor response was observed in 5% with the objective method and with no patient with the subjective method. A moderate response was achieved by 25% and 30% with the objective and subjective assessment respectively. A significant response was obtained by 55% objectively and 10% subjectively. 75–100% was achieved by 15% and 60% in the objective and subjective analysis respectively. The two methods significantly correlated with each other but the average subjective improvement rates were higher than the objective rates.
Conclusions: Both objective and subjective analysis indicated that the large spot 532 nm laser is highly effective in the treatment of the neck and trunk. 3D color and area objective analysis provides an accurate tool to measure the efficacy of PWS treatment.
Key words: port-wine stain, KTP, pulse dye laser, 3D, laser, port-wine stain.

Introduction
Port-wine stain (PWS) are a common type of cutaneous capillary malformations that affect 0.3% of newborns. They are related to segmental mosaicism and they can occur in all body regions following the patterns of vascular embryogenesis [1–4]. Lasers are the first line option for the treatment of PWS. There are several types of devices available for PWS treatment, including pulse-dye laser (PDL), intense pulse light (IPL), small and large spot 532 nm KTP (potassium-titanyl-phosphate) laser, and 1064 nm neodymium-doped yttrium aluminum garnet (Nd:YAG) laser. Others such as alexandrite 755 nm or diode 800–983 nm lasers are less commonly used and argon, copper and krypton lasers are currently not recommended because of the poor safety-to-efficacy profile [5]. Recently photodynamic therapy (PDT) has shown promising results for the treatment of PWS in Chinese patients [6].

Beside PDT, all these devices use hemoglobin as a photon absorber to destroy affected vessels. The majority of patients respond to treatment, but clearance is hardly ever achieved. The degree of improvement depends on several factors including the type of device used and PWS localization. Although PDL is recognized as the most effective, the large spot 532 nm KTP laser has recently been shown to be...