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THE USE OF OPTICAL COHERENCE TOMOGRAPHY TO GUIDE LASER TREATMENT OF VASCULAR SKIN CONDITIONS

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Background: Currently, laser surgeons choose treatment parameters for vascular lesions based on clinical information including patient age and skin type and lesional colour, thickness and location. Optical coherence tomography (OCT) can provide additional information about cutaneous blood vessel diameter, depth and density. We hypothesized that OCT can help guide selection of laser parameters for individualized therapy.

Study Design/Materials and Method: Subjects 12-year and older with cutaneous vascular conditions including port wine birthmarks, rosacea/telangiectasias and angiomas were enrolled in an IRB approved study in which OCT imaging was used to determine the superficial plexus depth (SPD) and the diameter and density of vessels. The SPD was calculated as the mid-level between the skin surface and the depth at which blood flow was highest. At this depth, the modal vessel diameter and density were determined by automated analysis of OCT images. This information guided the selection of treatment parameters. Pre- and post-treatment photographs were compared, and improvement graded by dermatologists not otherwise involved in the study.

Results: OCT measurements took 30 seconds per imaged location and were associated with no discomfort. Vessel parameters often differed from clinical expectation. Vessel diameters ranged from 0.036 to 0.270 mm, and SPDs from 0.117 to 0.290 mm. In a number of cases, vessel diameter varied between different locations in the same subject. Measurements in some cases indicated that pulse duration should be longer than normally utilized in our clinic, targeting larger vessels, mainly for PWB. No increase in adverse effects were noted with the OCT guided parameters. The majority of subjects had improvement in their condition.

Conclusion: OCT rapidly provides information on vascular lesions including SPD and modal vessel diameter and density at this level. This information can be used for selection of laser parameters, providing individualized treatment of cutaneous vascular conditions.