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Publication Date

2002

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INVESTIGATION OF THE USE OF CHEMICAL AGENTS TO IMPROVE LASER TREATMENT OF PORT WINE STAINS

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Laser treatment of port wine stains (PWS) requires delivery of a sufficient amount of laser light to the targeted blood vessels to heat and destroy them. Laser wavelengths currently under investigation for PWS treatment (e.g., 577, 585, and 595 nm) are highly scattered by the dermis. We hypothesize that a reduction in light scattering would improve the efficacy of PWS laser treatment. Previous studies have shown that hyperosmotic agents can reduce the amount of dermal scattering, rendering the skin more transparent. The results of these studies were obtained either through injection or direct application to the dermis. Ideally, an agent can be applied directly to the skin surface and passively diffuse into the skin. However, the stratum corneum acts as a resilient barrier to chemical delivery into the underlying skin layers. The goal of this study was to identify compounds that can diffuse into the skin after topical application. *In vitro* human skin samples were placed on Franz diffusion chambers and sealed with an o-ring to minimize dehydration. 100 μ L of a given compound was placed onto the skin surface, and optical coherence tomography (OCT) was used to measure the depth-resolved skin backscattering signal at different timepoints over a 24-hour period. In total, 14 compounds were evaluated, of which two were identified as substantially improving OCT imaging depth and hence skin transparency. We are currently investigating different methods for improving the rate of agent diffusion into the skin.