117

SKIN PIGMENTATION INDEX AS A PREDICTIVE PARAMETER FOR OPTIMIZING LASER AND LIGHT TREATMENTS

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A quantitative and objective technique for predicting possible side effects and optimizing treatment parameters of a laser- or light-based dermatological procedure is highly desirable. Until now, no commercial devices realizing this function were available.

In this study, we investigated the feasibility of using real-time measurements of the skin pigmentation index (PI) for this purpose. The PI is defined as a quantity proportional to the concentration of melanin in the skin. The PI was determined from the slope of spectral dependence of the skin reflectance in the red spectral range. Group of patients with different skin types and PIs varying in wide limits has been test-treated with a flash-lamp-based photoepilation system. The PI has been measured pre- and post-treatment. We found a strong correlation between the pre-treatment PI and the incidence of side effects. In addition, the safety threshold levels of fluence and pulsewidth have been determined as a function of the pre-treatment PI. Based on these results, we have built a prototype of the control feedback system, which integrates a PI sensor into design of a flash-lamp-based device. The integration area of the PI sensor coincides with the treatment area of the device. Thus, the PI data are collected exactly from the site designated for treatment immediately prior to the procedure. The control unit then selects optimal treatment settings (fluence and pulsewidth) according to the measured PI value.

The proposed feedback system may significantly decrease risk of side effects and extend patient population for a number of laser- and light-based dermatological procedures.