Monitoring laser-tissue interaction by non-linear optics

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摘要

Abstract

To assess laser therapies in clinical practice, histologic examinations were commonly used. But histologic examinations were invasive and not real-time in nature. In this work, we validate multiphoton microscopy as a useful modality in evaluating laser-tissue reaction in vivo. Multiphoton microscopy based on femtosecond titanium-sapphire laser system were used to evaluate autoflurescence (AF) and second harmonic generation (SHG). Nude mouse skin was irradiated with Erbium:YAG laser at low to high fluence. High resolutional images can be obtained by multiphoton microscopy. At low fluence, Erbium:YAG laser can selectively loosen compact stratum corneum with minimal injury to basal layer. At high fluence, ablated keratinocytes and residual debris can be imaged. The laser thermal effect on dermis could be measured by SHG signals of collagen fibers. SHG decreased as laser fluence increased. Multiphoton microscopy is a useful in-vivo technique in evaluating ablative and thermal effects of Erbium:YAG laser on nude mouse skin.