招待講演

New Aspects of the Application of Pulsed Lasers in Medicine

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The therapeutic use of lasers is still dominated by cw lasers and the thermal effect to coagulate and vaporize tissue. With the experience that tissue removal is power-dependent and the zone of thermal damage is power- and time-dependent, fast scanning devices are used to reduce the zone of necrosis when removing only thin layers of tissue.

This effect can be optimized when pulsed lasers are used for ablation of soft and hard tissue. By varying the laser emission wavelength and the according light penetration depth, the pulse duration and of course the energy per pulse, the ablation efficiency and the side effects can be modulated. Beside thermal damage, acoustic effects have to be taken into account.

Working below the threshold of ablation, pulsed lasers are suitable also to selectively coagulate tissue, e.g. in dermatological vascular lesions like portwine stains. Enormous efforts have been undertaken to understand the laser tissue interactions and to optimize the clinical results. Therefore, with this knowledge, several new laser developments appeared on the market to improve the laser treatment.

New fields of medical laser applications are explored in many disciplines to treat soft and hard tissue. Progress has been achieved in dermatology for the therapy of vascular and pigmented lesions as well as benign epithelial

disorders. Mid infrared lasers (Er YAG laser) are used now in dentistry very successfully to ablate not only enamel and dentin but also superficial soft tissue. There are expectations to develop this laser to be a general surgical instrument in stomatology. IR-lasers have proved to be successfully applied also in ophthalmology, in ENT, and orthopaedics to treat bones and other hard tissues.

So, in future for selective medical applications, pulsed lasers are well suited to enhance the efficacy of the laser treatment.