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## **Comparison of thermal and mechanical effects in tissue depending on laser parameters of Er;Cr:YSGG and Er:YAG lasers using high-speed thermal optical thermography**

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The Er;Cr:YSGG (2.79  $\mu\text{m}$ ) and Er:YAG (2.9  $\mu\text{m}$ ) lasers have become accepted as useful instruments in a variety of different medical applications from dentistry, surgery to dermatology. With slightly different wavelengths around a steep water absorption peak and pulse shapes, there might be a substantial difference in ablation and thermal effects during laser-tissue interaction between the Erbium laser systems in soft tissues.

In this study, specialized imaging techniques were used to visualize the ablation, heating and heat dissipation during laser tissue interaction. Using a high speed thermal imaging setup based on color Schlieren techniques, a relative comparison between parameters as energy, pulse durations were obtained in a tissue model of polyacrylamide gel with a composition of 90% water, providing a target similar to soft tissue.

Significant differences in the ablation depth as well as residual thermal effects were observed by changing the pulse duration and the repetition rates for fixed energy densities. These results can have an considerable impact on the clinical performance of the Er;Cr:YSGG and Er:YAG lasers. The high speed thermal imaging technique provides a tool to find the optimized laser parameters for specific medical applications.