

Refractive Laser Systems: Solid State (213nm) vs Excimer (193nm)

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Purpose: To compare investigational scientific data between the solid state (213nm) and excimer (193nm) laser-tissue interaction to demonstrate clinical and therapeutic advantages of a solid state laser for custom surgery over an excimer laser system.

Methods: The safety, efficacy and reliability of the laser-tissue interaction between solid state (213nm) and excimer (193nm) laser systems are compared using histological, infra-red thermal imaging and UV absorbance spectrum. Solid state and excimer laser ablation characteristics on *in vitro* porcine corneas were histologically processed and analysed qualitatively by light (LM) and transmission electron microscopy (TEM). Temperature change during laser ablation was measured *in vitro* for porcine corneas, PMMA, and hydrogel (hydrated & dehydrated) samples using a real time infra-red thermal imaging camera. Absorbance (%A) of UV wavelengths 193nm and 213nm through various ocular eye lubricants and 0.9% NaCl were investigated using a UV spectrophotometer.

Results: Current experiments confirm the suitability of solid state 213nm for refractive surgery. Qualitative assessment of histology reveal smoother and more uniform ablated surfaces with no evidence of thermal damage following ablation with the solid state laser than the excimer system. The 213nm UV wavelength is significantly less absorbed in 0.9% NaCl in comparison to 193nm (Absorbance in 0.9% NaCl: 33%A for 213nm and 97.5%A for 193nm), therefore solid state lasers have advantages in the clinical setting with more reliable and predictable outcomes without the need for corneal hydration monitoring during surgery. Suitability of various ocular lubricants for possible 213nm 'masking agents' will be discussed along with the results from an infrared thermal imaging study between the two laser systems. Post operative clinical results following refractive surgery with the CustomVis™ Pulzar Z1 solid state laser system will also be presented.

Conclusion: Solid state laser systems incorporating the 213nm wavelength represents a safe, reliable and possibly a more precise device to deliver optimal custom refractive surgery.

Financial Interest

Dr Mukesh Jain is an employee of CustomVis. Dr Paul van Saarloos is the CEO of CustomVis.